DOCUMENT RESUME

ED 328 467 SO 021 016

AUTHOR	Duric, Ladislav
TITLE	Essentials of Educational Psychology.
INSTITUTION	International Bureau of Education, Paris (France).
SPONS AGENCY	United Nations Educational, Scientific, and Cultural Organization, Paris (France).
REPORT NO	ISBN-92-3-102631-3
PUB DATE	89
NOTE	166p.; Part of the series, "Educational Sciences."
AVAILABLE FROM	Jessica Kingsley Publishers, 118 Pentonville Road, London N1 9JN England.
PUB TYPE	Books (010) -- Reports - Research/Technical (143)
EDRS PRICE	MF01/PC07 Plus Postage.
DESCRIPTORS	Creative Development; Creative Thinking; *Developmental Psychology; *Educational Psychology; *Educational Research; Elementary Secondary Education; Foreign Countries; Higher Education; Public Schools; School Role; Social Influences; Student Attitudes; *Student Development; Student Experience; *Student School Relationship; Surveys; Tables (Data)
IDENTIFIERS	*Czechoslovakia

ABSTRACT

Children mature into adults through their own activities and the influence of their social environment. One such social influence, education, is purposeful, planned, and institutionalized. Educational psychology investigates the psychological foundations of this process, particularly in the development of humankind. The publication focuses on such topics as: (1) general problems of psychology in education and upbringing; (2) special issues of educational psychology; (3) psychological issues of teaching and learning; (4) psychological aspects of developing creative thinking among pupils and students; (5) performance and fatigue among pupils and teachers; and (6) the place of psychology in the Czechoslovak education system." A 41-item bibliography is appended. (NL)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED328467

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

JOHN FOX

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

SO 021 016

2

50

Educational sciences

Essentials of educational psychology

Ladislav Ďurič

Prepared for the
International Bureau
of Education

Jessica Kingsley Publishers
in association with

UNESCO

3

In the series 'Educational sciences':

Landsheere, G. De. *Empirical research in education.* 1982. 113p.
Zverev, I.D. *Teaching methods in the Soviet school.* 1983. 116p.
Kraevskij, V.V.; Lerner, I.Y. *The theory of curriculum content in the USSR.* 1984. 113p.
Léon, Antoine. *The history of education today.* 1985. 117p.
Bronckart, Jean-Paul. *The language sciences: an educational challenge?* 1985. 105p.
Mialaret, G., et al. *Introduction to the educational sciences.* 1985. 106p.
Camilleri, C. *Cultural anthropology and education.* 1986. 171p.
Siguán, M.; Mackey, W.F. *Education and bilingualism.* 1987. 147p.
Bhola, H.S. *World trends and issues in adult education.* 1989. 177p.
Ďurič, Ladislav. *Essentials of educational psychology.* 1989. 163p.

First published in 1989 by Jessica Kingsley Publishers,
118 Pentonville Road, London N1 9JN
in association with the United Nations
Educational, Scientific and Cultural Organization,
7, place de Fontenoy, 75700 Paris, France

ISBN: 92-3-102631-3

© Unesco 1989

Printed and bound in Great Britain by
Biddles Ltd, Guildford and King's Lynn

Preface

The obligations of teachers concerning the education and upbringing of children, young people and adults are very demanding. They are expected not only to know about their subject and to be familiar with the educational sciences, but to be acquainted with other related and inter-disciplinary fields as well, including psychology.

The International Bureau of Education (IBE) has resolved to include in its series of monographs on the 'Educational sciences' one dealing with the psychological problems involved in education and upbringing. To write this work the IBE turned to Ladislav Ďurič, a professor in the Department of the Psychological Sciences, Philosophical Faculty, Comenius University, Bratislava, Czechoslavakia. This means that, as well as dealing with educational psychology as such, he has been able to present all the psychological specializations which have a bearing on education in formal and non-formal settings, but particularly school psychology and teacher psychology. Naturally, most space has been devoted to psychological issues in the formal process of education, since the school still occupies the principal position in the education of future generations of workers.

We are well aware that, throughout modern history, mankind has been faced with and has overcome scientific and technical challenges to such an extent that scientists must take seriously into consideration the relationship between man and the machine. The industrial revolution has led inexorably to the age of computers; the time is now ripe for a revolution in the humanization of technology. A key role in this revolution should be played by psychology (a science about man) or the psychological sciences, especially those on the borderline with the educational sciences.

A prominent psychologist has stated that, at the turn of the millenia, a leading science will almost certainly be psychology for, if this were not the case, there is

a risk that this role may be assumed, both in theory and practice, by psychiatry!

The International Bureau of Education expresses its profound gratitude to Ladislav Ďurič for this monograph introducing the subject of educational psychology. The author has drawn on works by authors from both Socialist and Western countries, as well as on the results of his own research.

The ideas and opinions expressed in this book are those of the author and do not necessarily represent the views of Unesco. Moreover, the designations employed and the presentation of the material throughout this publication do not imply the expression of any opinion whatsoever on the part of Unesco concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitations of its frontiers or boundaries.

Contents

Introduction *p. 7*

Chapter I — General problems of psychology in education and upbringing *p. 9*
Definitions of educational, school and teacher psychologies p. 10
The relationship of educational psychology to the psychological and educational sciences p. 15
Narrower and broader concepts of educational psychology p. 21
The system of educational psychology p. 24

Chapter II — Special issues of educational psychology *p. 26*
Psychological foundations of education p. 26
Educational-psychological principles of educational influence p. 43
Psychological foundations of moral education p. 49
Psychological analysis of methods of moral education p. 58

Chapter III — Psychological issues of teaching and learning *p. 64*
General psychological problems of learning p. 64
Kinds of learning p. 67
Psychological learning theories p. 75
The laws of learning p. 90
Learning methods p. 90

Chapter IV Psychological aspects of developing creative thinking among pupils and students *p. 100*
Basic theoretical and methodological foundations for the development of creativity p. 100
The concept of creativity p. 101
The characteristics of creative abilities p. 102
Intelligence and creativity p. 106
The development of creativity p. 108
The direction of creative thinking and the role of the creative pupil in the classroom p. 110

Chapter V Performance and fatigue among pupils and teachers *p. 117*
Theories of fatigue p. 117
Mechanisms of fatigue p. 123
Kinds of fatigue p. 126
The performance of pupils and teachers in the educational process p. 134

Chapter VI The place of psychology in the Czechoslovak education system *p. 150*
A concise description of the Czechoslovak education system p. 150
The amount of psychology in the secondary school curricula p. 152
The educational counselling system p. 153

Conclusion *p. 160*

Appendix Selected bibliography *p. 162*

Introduction

Every man is a unique being. Along with the features and characteristics shared with other people, i.e. the universal ones, each man has many particular characteristics. The individual is born as a man, but only gradually, with the help of adults and through his own activity, becomes an individual. As for the adults' influence, the decisive role in this process is played by education which is purposeful, planned, professional and institutionalized. Besides the educational influences, there are also environmental agencies affecting the developing individual. These are external influences. However, the development of the personality is also influenced by its own inner activity, through individual characteristics and the way external influences are interpreted, which results in internal attitudes affecting the way further external influences are understood. Thus it happens that, in the process of personality formation, the pupil and the student are not only the objects of education, but also the subjects of their own development. These subjective tendencies are most particularly the concern of psychology.

The first two chapters of this monograph give accounts of those psychological disciplines which contribute most to the theory and practice of education. We acknowledge the prominent position of educational psychology in this respect, simultaneously stressing the significance of other psychological disciplines, especially school and teacher psychologies, while taking account of the basic related sciences, such as general psychology, developmental psychology and social psychology, as well as the educational sciences. In our opinion, educational psychology is concerned not only with the psychological sciences, but also with the educational sciences. It originated first of all from the practical needs of education and also as a result of a differentiation in psychology. Educational psychology can be most helpful to the educational sciences when it anticipates, i.e. it precedes them in theory and research. In this way it could become a basic component of the educational sciences, at the same time going

beyond the borders of these disciplines. Educational psychology, as an independent specialized discipline, provides valuable information both for school psychology as well as to teacher psychology.

In the historical development of the psychological sciences, educational psychology was originally conceived in a different way from our present approach. At first it provided psychological knowledge for educational theorists and practising teachers. It was more school or teacher psychology than educational psychology as we conceive it at present. For these reasons under the historical term 'educational psychology' we, too, shall come to understand psychology in education.

CHAPTER ONE

General problems of psychology in education and upbringing

The extent to which the psychological sciences contribute to education and upbringing both in formal and out-of-school settings, starting with the family and ending with educational and cultural institutions for pensioners, is not negligible. We are constantly exposed to learning experiences. When we are young, education and upbringing have a directed form (guided learning). As the individual grows and develops, it is the self-upbringing and self-education aspects that gradually dominate. Among adults in professional life, this form of education and upbringing prevails.

Psychology is one of those sciences which, with the help of other disciplines, is also concerned with the application of the educational process in the classroom. This involves the conduct of research on the psychological background of educational and learning processes among groups and individuals.

The sciences of education, dealing with education in the broadest sense of the word, have a priority position in education and upbringing. Nevertheless, they draw upon and utilize information from many other sciences and scientific disciplines, including psychology and particularly educational psychology

When we read or hear of psychology in education and upbringing, we immediately associate it with educational psychology. These associations follow mainly from the historical development of those notions that are summed up under the term 'educational psychology'. All psychological notions that have been either directly or indirectly connected with education, but especially with teaching, are considered to be associated with educational psychology.

At present we already know that the study of educational psychology exists and that it comprises school psychology and teacher psychology. Therefore, when we talk in this monograph about educational psychology, we mean all of its component parts, i.e. educational psychology itself, teacher psychology and also to a certain extent school psychology. School psychology and teacher psychology both originate in the needs of educational practice, as well as from

the stimulation of educational psychology. Educational psychology itself is a specialized, theoretical, trans-disciplinary science, that has no direct contribution to make to educational practice. Its contribution is mediated through the educational sciences and it therefore represents one of the basic disciplines making up the educational sciences

DEFINITIONS OF EDUCATIONAL, SCHOOL AND TEACHER PSYCHOLOGIES

The task of investigating and defining the domain of any science represents a serious theoretical problem. This is especially true of inter-disciplinary sciences, such as educational psychology, but also of applied psychological disciplines, such as school psychology and teacher psychology.

Defining the limits of these psychologies will avoid inaccurate and vague formulations of ideas likely to lead to confusion. It makes our scientific language more precise and more intelligible — there are no misunderstandings and it becomes possible to describe the methodology of these disciplines.

School psychology is at present conceived as a psychological discipline employed by professional school psychologists. It is an applied discipline. While its subject has not yet been definitively established, school psychologists are already at work in the larger schools in most developed countries.

Teacher psychology has been cultivated since the very origins of psychology, but it has only ever been made up of contributions from other psychological disciplines, such as general, developmental, educational, social or school psychology. Teacher psychology means the scientific knowledge that a teacher requires in order to carry out his/her function most effectively.

Educational psychology represents one of the oldest psychological disciplines. It comprises the psychological notions connected with education. It originated approximately 100 years ago, which corresponds to the origin of experimental psychology itself (Wundt's Psychological Institute, Leipzig, 1879). Since then it has undergone various influences concerning its subject matter, aims and content. These trends may be chronologically divided into five basic groups.

Development of views on the subject of educational psychology

In the very beginning, the *first view* of educational psychology meant the application of the knowledge of general psychology (or simply psychology) to the theory and practice of education and upbringing.

This view originated in the second half of the last century when psychology as a science separated from philosophy. The achievement of independence or the

rise of an independent scientific discipline is attributable to the experimental method. The right to be called 'scientific' applied at that time only to experimental psychology. Even so, experimental psychology often investigated issues that were directly or indirectly connected with educational problems. For example, research on memory perception, attention spans and other mental phenomena were also of interest to educationists, both theorists and practitioners, and in return the observations of educationists were of great significance for the work of psychologists. The experimental psychologist also sought contact with educators to find out if the results obtained in the experiments were verifiable, modifiable and acceptable, i.e. if they helped to improve teaching practice. Many surprising results arising from experimental psychology drew the attention of educators to psychology, and this extraordinary interest stimulated the origin of that branch of psychology directed towards assisting the sciences of education. This psychology came to be called 'educational psychology'.

However, it would not be correct to presume that before the rise of experimental psychology there were no attempts to build the science of education on psychological foundations, or to make use of psychological knowledge in education. Already J.H. Pestalozzi (1746-1827) stressed on several occasions that educational theorists and practitioners needed to know how the laws of psychic mechanisms affected their work.

J.F. Herbart (1776-1841), who tried to separate the educational sciences from theology, stressed the fact that the science of education was dependent on practical philosophy (ethics) and psychology. According to him practical philosophy (ethics) should point out the objectives, while psychology highlighted the ways, means and risks. He saw the educational sciences as independent, but built on two pillars: ethics and psychology. Later on, there were authors who proclaimed that the sciences of education represented only the application of psychologial findings to education, in the same way that agriculture simply applies the principles of chemistry in practice. This was the view held by the Scottish philosopher and psychologist A. Bain (1818-1903), according to whom upbringing meant cultivation of mental life, guided (directed) by psychology.[1]

These were the views of some experts on the immediate application of general psychological knowledge, particularly to educational practice but also in part to educational theory. Even the psychologists working in the field of general psychology (and psychology in general) must have been aware of these events and so they tried to resolve the situation by introducing the term 'educational psychology', expressing the relation between the results of experimental (later on, even theoretical) works of psychologists and educational practice. 'Educational psychologies' contained knowledge of relevance to teaching to be acquired by future teachers. This gave rise to textbooks of

educational psychology. Nowadays, however, these are considered as textbooks of teacher psychology.

'Educational psychology' had its textbook sooner than its domain, research methods and parameters were delimited. The first textbooks on educational psychology, based on the above views, were published in 1884 by G. Mayer and in Bohemia in 1913 by J. Šustal.

There are, however, researchers who do not agree with the direct application of general psychological notions to educational theory and practice in the form that educational psychology was thus conceived.

According to this *second view*, the domain of educational psychology is the application of the knowledge of developmental psychology to educational theory, but especially to the practice of education, teaching and upbringing.

These views were already evident at the beginning of the present century. After the failure of the application of general psychology to the practice of teaching and upbringing, educators set great hopes on developmental psychology. Developmental psychology gradually became an important auxiliary for the sciences of education. Under the influence of such prominent developmental psychologists as A. Binet (1857-1911), B. Claparède (1873-1940), and later on J. Piaget (1896-1982) and some others, the centre of education, teaching and upbringing concentrated on the activity and development of the child. The psychology of the child took precedence. Claparède was a great propagandist in favour of the application of developmental psychology to the educational sciences. Thus he came to lay the foundations of educational psychology.

Significantly active in the field of propagating child psychology in education was the American psychologist G.S. Hall (1846-1904), who is considered to be the founder of child psychology and pedology.

The pioneering activites of Hall in the field of child psychology started in 1881 in Boston, where he gave a course of twelve lectures. The basic idea of the course was to found education as a science using observation and investigation of the child — on 'child-study'.

However, it was shown that even these endeavours did not achieve the expected success. The connection between psychology and the educational sciences was not complete. Knowledge of child psychology could not be simply applied to complex educational phenomena, not even when some authors tried to incorporate child psychology (as a part of developmental psychology) into the newly created educational psychology, or at least to bring these two scientific disciplines together to form one whole.

Attempts at the direct application of the outcomes of child psychology to the sciences of education came to be called 'psychologizing' and later on they were abandoned both by educational theorists and practical teachers and educators,

since they often led to didactic and educational stagnation. According to Kelemen (1981) — an opinion we share — the task of educational psychology is not only to investigate changes of psyche in the development of personality, but rather the psychological foundations of the educational process. The educational process is a complex one and must be conceived as a constant interaction of the teacher's educational activity and personality formation in the pupil.

The *third view* identifies educational psychology with the educational sciences. In the past the authors of this view wanted to replace the sciences of education by psychology.

We have already pointed out the attempt by Herbart to construct the sciences of education on two pillars: practical philosophy (ethics), pointing out the objectives; and psychology, indicating the ways and means, as well as the risks.

P.E. Beneke (1798-1854), the German philosopher, psychologist and educator, went still further. As a representative of German philosophical psychologism, he considered the sciences of education as applied psychology. Beneke introduced the psychologizing trend to philosophy as well. According to his view, psychology represents the basic starting-point both for philosophy and logic. Psychology has the basic task of setting the goals of education through philosophy. The reform of psychology should therefore cause the renaissance of education.

A strong influence on psychologizing movements may also be seen in various extreme child-centred trends in education, where the spontaneous activity of children is strongly stressed. These older opinions form the basis for the revival of psychologizing trends in education.

Even with the founders of experimental education, especially Meumann (1862-1915), there was great indecision in setting the bounds between experimental education and experimental psychology (in many respects the problem remains today).

The determining role of psychological knowledge (especially that of child psychology) in education may also be seen in the so-called 'dynamic education' which, in the same way as the other reform movements of 'new education', considered the inborn powers of the child to be the main factors in education.

Gestalt psychology, or its influence on the practice of teaching, also testifies to the absorption of education by psychology. Under the influence of Gestalt psychology, the method of teaching reading and writing in elementary classes was completely changed. As a result of this psychological trend in many European countries, between the two world wars, the so-called 'global method' of teaching reading and writing was adopted.

An attempt at a more systematic application of Freud's general psycho-analytic theory to education was made by his daughter Ann, especially in her lectures for fellow-workers in Viennese child asylums in 1926. These lectures formed the basis for the first introductory manual to psycho-analytic education, published in a Czech translation in Prague in 1937 [2].

The great influence of psycho-analytic psychology on the theory and practice of education is reflected also in the fact that in 1926 the *Zeitschrift für psychoanalytische Pädagogik* [Journal of psycho-analytic education] appeared for the first time.

The influene of profound psychology on the science of education was still more expressly reflected in the conception of the Viennese physician A. Adler (1870-1937), who was the founder of individual psychology [3].

The domain of education, school and teacher psychologies cannot be substituted for the educational sciences. Education is the science of the foundations of more complex phenomena than those covered by these psychological disciplines. While educational psychology is concerned with research on instruction and upbringing, it investigates them 'only' from the psychological point of view and not in all their complexity. The same is true with school and teacher psychologies.

The *fourth view* almost completely subordinated educational, school and teacher psychologies to education, incorporating educational psychology into the system of educational sciences, with its domain determined by that of education.

The roots of this view should be looked for already among the origins of the concept of educational psychology. Educational psychology arose first of all from the educators' need to know the psychological influences and foundations affecting the process of education and upbringing, as well as resulting from the differentiation of psychology.

When the psychologizing trends in education failed to provide the expected results, educators either completely rejected psychology, or subjugated it to a minor role. But in this case it was not only a matter of the subordination of educational psychology to education, but often the subjection of psychology in general.

The causes might be found even there, where psychology starts to be mentioned as an auxiliary scientific discipline to education.

The partial or complete subordination of educational psychology to education often found its reflection in practice in the fact that the educational-psychological and educational interpretations or descriptions of certain phenomena were often contradictory, even confused. As we have already stated, the boundaries of both scientific disciplines were erased during research, but especially in textbooks.

Nowadays, these views are being slowly, but ever more resolutely, rejected. Educational psychologists consider educational psychology to be a special psychological discipline having a common border with the sciences of education and providing education with valuable scientific information. The author of this monograph is one of the representatives of this concept, as is reflected in several of his works [4, 5].

The *fifth view* acknowledges that the subject of educational psychology represents an independent sphere of objective reality which is not investigated, either specifically or directly, by either general, developmental or social psychologies, and even less by the educational sciences. The independent sphere representing the subject of research for educational psychology will be specified after we have explained the relations between educational psychology and general, developmental and social psychologies, as well as the educational sciences.

THE RELATIONSHIP OF EDUCATIONAL PSYCHOLOGY TO THE PSYCHOLOGICAL AND EDUCATIONAL SCIENCES

In the first part of this chapter we stated that, at the very beginning, educational, school and teacher psychologies were conceived as the application of the knowledge of general or developmental psychology to the theory and practice of education and teaching. In the early days of educational psychology this was only natural. Educational psychology was dependent first of all on progress in these basic psychological disciplines. In the course of the development of educational psychology over more than one hundred years, the relation of this discipline to general and developmental psychologies has changed.

The relationship between educational psychology and general psychology

In its research and theoretical works, while investigating the foundations of psychic phenomena in man, general psychology has produced certain findings with educational implications, either in the sphere of upbringing in the narrower sense of the word, or in the sphere of education and upbringing. These findings could, can and even must be utilized in educational theory and practice, since teaching and upbringing refer to man and are carried out by man (parent, teacher, educator), and should be guided by psychological principles. General psychological principles are valid both for the person being educated (child, pupil, student) as well as for the teacher or other educational worker.

The relationship between general and educational psychology, as pointed out by F. Jiránek [6], may be expressed as that of the general to the particular. General psychology studies the psychological phenomena of man in general. The same psychic phenomena are also explored by educational psychology, but under particular circumstances. Educational psychology obtains from general psychology such general theoretical viewpoints as, for instance, the problem of determinism in psychology, the question of social and biological points of view, etc., as well as the results of research on specific mental phenomena. Educational psychology also conducts research on these issues, but from the point of view of its own objectives. On the other hand, the results and conclusions of educational psychology also enrich general psychology, since knowledge of the special (educational psychology) contributes to more accurate and authenticated generalization (general psychology).

In attempting to clarify the differences between the subjects of general and educational psychologies, T. Pardel [7], the Slovak psychologist, proposed the following formulae: the purpose of research on general psychology: *S-P-R* where *S* stands for stimulus (variable), *P* for personality (variable) and *R* for response.

Even for educational psychology, Pardel proposed the above formula as a starting point, warning that educational psychology, contrary to other basic psychological disciplines, only deals with those stimuli having an educational character. This is, according to him, the educational reality *(Er)* containing in itself the educational objectives *(Eo)*. Educational reality then represents the *S* variable, with educational objectives being reflected in it, i.e. the relation between educational reality and educational objectives is interactive, $S=Eo/\rightleftarrows Er$. The complete formula in educational psychology is then the following one:

$$S/Eo/\rightleftarrows Er/\text{-}P\text{-}Ro$$

while in educational psychology only responses evaluated and classified are of interest, i.e. *Ro*, response from the point of view of educational objectives. For the purpose of educational psychology the formula proposed by Pardel is then the following one:

$$S/Eo/\rightleftarrows Er/\text{-}P\text{-}Ro.$$

These views suggest that general psychological knowledge cannot be regarded as the same as that of educational psychology, since they represent separate and specialized domains.

To conclude our discussion of the relation between educational and general psychologies, we shall quote a statement by S.L. Rubinštejn [8]:

Any attempt to build, for example, educational psychology in the form of 'educational conclusions' of external mechanical application or theses of abstract psychology to concrete conditions of psychic development of the child, theses obtained independently of these conditions, is in its substance incorrect.

The relationship between educational psychology and developmental psychology

Developmental psychology is of great importance both for the educational sciences and for the practice of education and upbringing. This is due to the fact that the educator must be aware of the psychological principles for the development of man (children, youth and adults). At the beginning of our century, the significance of developmental psychology for the educational sciences was overestimated, as is witnessed by a succession of educational reform movements.

Nevertheless, there is a difference between the purpose and the tasks of developmental and educational psychologies. Developmental psychology investigates the evolution of man's psyche at a general level, respecting the fact that this evolution is particularly affected by the process of education and upbringing, but it does not specifically study the actual influence of this process. Developmental psychology does not even consider interaction between the complex educative action of the teacher and the psychic development of the pupil. This means, then, that it does not elucidate the psychic foundations for the processes of education and upbringing. These foundations are researched, discovered and explained by educational psychology. V. Příhoda [9] considers developmental psychology to be a 'purer' science, since its objective is 'in substance to get to know the development and structure of a child's mind'.

An important difference between developmental and educational psychology lies in the fact that educational psychology is interested in more than the pupil's mental phenomena in educational situations, even though many educational psychologists oriented to child psychology have stated the opposite. Educational psychology has broader tasks, due to the complexity of the process of education and upbringing in formal and informal situations. This process is a bipolar one. It represents a mutual interaction between the pupil and the teacher, between the educative action of the teacher and the pupil's psychic modifications caused by that action. Besides, as a rule in public educational institutions, one educator does not influence one pupil, but rather a group, a class, a community of pupils. Education takes place under particular psychological circumstances. Educational psychology must take note of these facts, as well as other influences. This means that, in comparison with developmental psychology, its research is not focused only on the child and the

young person, but on many other factors and agencies in the process of upbringing, education and teaching.

The relationship — but also the difference — between developmental and educational psychology was very clearly expressed by a well-known Hungarian educational psychologist L. Kelemen [10]: while developmental psychology investigates the general laws concerning the development of man's psyche, educational psychology considers the psychological laws of personality formation and development, during the educational process.

The relationship between educational psychology and social psychology

The justification for social psychology is the social determination of human behaviour. For social psychology this is the natural starting point in order to explain the individual's social behaviour, interpersonal relations and the dynamics of small and large groups. Social psychology investigates the problems of the individual's attitudes in socially stimulating situations and his own participation in them.

In the setting of the school, it is a matter of the adjustment, the adaptation of the child to the social climate of the class, which is an aspect of personality development at the same time as a more complex process of individual socialization going on practically from birth till the end of life.

Once pupils enter school, the process takes place on two levels: (a) the external aspect, which can be described as social learning and social behaviour taking place through social contacts; and (b) the internal aspect, representing the interiorization of a synthesis of external social influences and psychic dispositions for social behaviour.

The school and the class represent for the pupil a particular type of society and, at the same time, provide the social climate for creative educational activities by both the pupil and the teacher — the educated and the educator. The purposes of social and educational psychology are not identical. The relationship between these two scientific disciplines has been recently made more explicit through a psychological discipline called 'social educational psychology'.

To conclude the issue of the relationship of educational psychology to general, developmental and social psychologies, it can be stated that, while the latter disciplines explore the basic, abstract foundations of the adult's psyche, the foundations for the development of man's psyche or basic processes of socialization, educational psychology investigates the psychological foundations of the individual's activities under specific educational circumstances and influenced by educational objectives, as well as by the age and individual characteristics of children, pupils and adults. Furthermore, it studies the psychological foundations, or rather the psychology of the process of education,

instruction and upbringing, with a view to discovering the bases of mutual pupil/educator interaction.

Educational psychology makes use of the basic theoretical and methodological starting points of general, developmental and social psychology, but it also has its own areas of independent and theoretical research, the results of which are then empirically verified in the educational situation, together with school and teacher psychologies.

The relationship between educational psychology and the educational sciences

Educational psychology has a very close relationship to the educational sciences. This much is obvious even from the very name of our discipline.

The close relationship of these scientific disciplines is evident first of all in the complexity of the purposeful, planned and systematic investigation of man's personality in an educational context. This concept follows from the effect of the influence of upbringing and education on the psyche of pupils and students, and from the effect of changes in the pupil's and student's psyche brought about by education, that is, by further educative action by the teachers.

In the midst of the educational and instructional process, it is impossible to conduct research on such simple issues as the mechanical influence of the teacher's work on subjective changes in the pupils' psyche. Similarly, it is not possible to limit study to the states and changes in the pupils' psyche exclusively in the educational context, without exploring inner dependencies on changes in the processes and conditions of education and upbringing.

The domains of educational psychology and the educational sciences have much in common. However, there are also differences.

According to F. Jiránek [11], educational psychology explores the causal relations of education and instruction (between conditions and consequences), while the educational sciences consider the final relations (between educational means and objectives). To confirm this statement, Jiránek further reasons that the main task in the whole process of education is being played by the human factor, namely educators, pupils and students, due to the bipolarity of the educative action. Their mutual interaction is studied by psychology. The educational activity of the teacher, aimed at the formation of the pupil's personality, represents an activity in the psychologial sense of the word. The pupil's activity in an educational situation represents the process of learning and the process of personality development. The actual process of research on this activity is traditionally the task of educational psychology. Contrary to this, the task of the educational sciences is the investigation of educational objectives, means and methods, since they are influenced also by economic,

political, organizational and other factors — that is to say not only psychological ones.

Before we approach the definition of educational, school and teacher psychologies in the following paragraphs, we shall sum up the relationship of educational psychology to other associated disciplines on the basis of Figure 1, taken from a remarkable work by G. Mialaret [12].

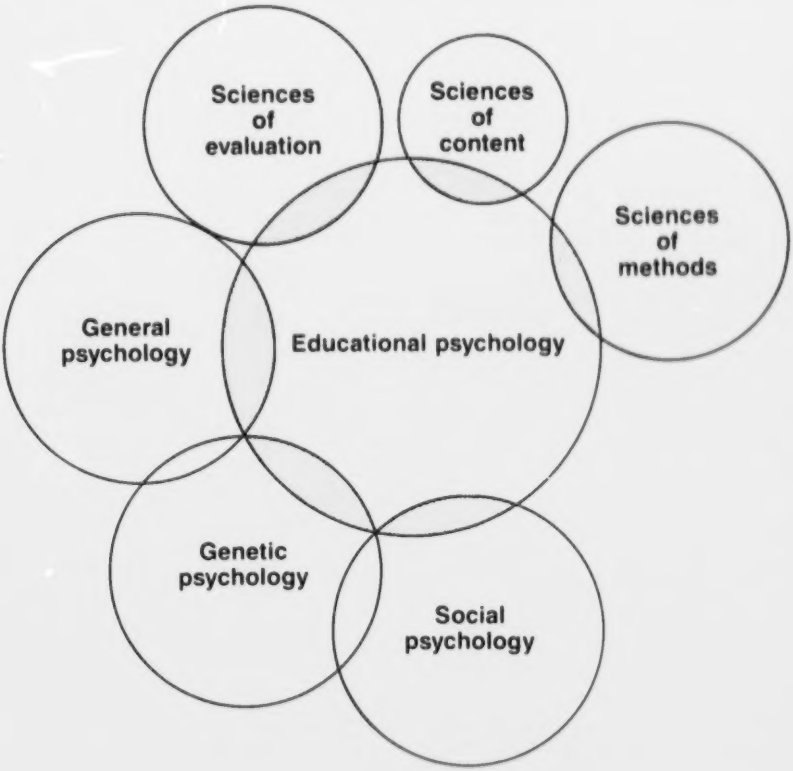

FIGURE 1. Educational psychology in relation to its associated disciplines

Mialaret conceives educational psychology in the broadest sense of the word. Our own definition is similar, but conceives the term of educational psychology as having several facets (we shall come to name them further on)

NARROWER AND BROADER CONCEPTS OF THE PURPOSE OF EDUCATIONAL PSYCHOLOGY

After partial clarification of the relationship of educational psychology to general, developmental and social psychologies, and to the educational sciences, we can approach the essential definition of our scientific discipline and try to define educational psychology itself.

At present the subject of educational psychology is defined in a narrower and a broader sense.

The representatives of the narrower concept allege that the purpose of our science is to study changes in the child's, pupil's or student's psyche caused by the influence of upbringing, education and instruction, i.e. the influence of educational activities and situations.

This view has been supported by many authors, especially those who perceive a close relation between educational and developmental psychology. One of them was J.M. Stephens [13], who considerd that the purpose of educational psychology was the systematic study of educational growth or development.

Representatives of the broader concept of the purpose of educational psychology stress that the subject of our science is, or should be, the investigation of the complex of psychological regularities of education, instruction and upbringing. J.S. Brunner [14], for example, reproaches educational psychologists for concentrating on the psychology of learning and not investigating the psychology of the theory of teaching. He suggests that the basic problem for educational psychology should form the psychological foundations of the theory of teaching. N.K. Levitov [15] also defines the purpose of educational psychology in a broader way: 'Educational psychology is called that branch of our science the task of which is to study the psychological foundations of education and instruction.' Educational psychology should examine the psychological foundations and characteristics of the process of education, upbringing and teaching. Since this process is a bipolar one, the purpose of educational psychology must be even more broadly conceived. The purpose of educational psychology is to investigate the psychological foundations and characteristics of the interaction between the educational activity of the educator and the personality development of the pupil. This means that educational psychology explores both psychological problems associated with the educational activity of the teacher and the influence of this activity on the development of the pupil or student, as well as the mutual interaction between them.

This definition of the purpose of educational psychology may meet with approval, but it is limited in that it concerns only its purpose in school or in an educational institution and does not take into account other forms of educa-

tion and upbringing. In substance it represents the purpose of formal educational psychology.

At this point it is necessary to introduce the differences between educational psychology (as a special inter-disciplinary psychology) and school psychology (as an applied psychological discipline).

As we have stressed in the introduction, educational psychology was developed in parallel with school psychology from the very beginning of experimental psychology. This was, of course, quite natural, since at that time there were no other educational institutions apart from the school. The educational process was almost exclusively undertaken in school and the psychological knowledge applied in the educational process was called educational psychology, even though it was in fact school psychology. This tradition still persists to this day.

Nowadays, the system of school psychology, as well as the system of teacher psychology, includes knowledge of general, developmental, social and educational psychology. Thus we can see that school psychology covers a broader context than that of educational psychology. Nevertheless, educational psychology should assume the position of priority over school psychology. The field of educational psychology is narrower, but its content is richer. That part of educational psychology concerned with teacher psychology may be called 'school educational psychology'. This fact means that we must also consider pre-school, formal school, out-of-school, remedial and special educational psychology, or eventually some others, the basic theoretical and methodological questions of which will be resolved by general educational psychology. The foundations of the educational-psychological sciences have already been laid. They are being reinforced by contemporary life, but especially by the future.

According to this approach, school educational psychology (or educational psychology of the school) represents an application of general educational psychology. It is utilized for the study of the psychological background of upbringing and education in school and at the same time it is an organic component of school psychology together with general, developmental, social or, eventually, other psychologies.

For the time being, classroom educational psychology is the most advanced of all educational-psychological disciplines, one of the reasons for this fact being that it is the oldest one.

The present situation shows that education and upbringing continue to extend their influence outside the school. Educational psychology must consider the specific psychological regularities pertaining in this varied educational activity.

With this general concept of the purpose and tasks of educational psychology we obtain the following definition: educational psychology is the science of the

psychological foundations of the educational process in schools and other educational institutions. This definition suggests that educational psychology studies or should study the entire psychological background associated with the process of upbringing, instruction and education in the family, school, children's homes, youth hostels, boarding houses, child and youth organizations, trade unions, sports clubs, social organizations, etc., i.e. in all places where the process of education, in the broadest sense of the word, is taking place. This comprehensive conception of educational psychology hints at individual areas of this science.

We have already attempted to define the purpose of educational psychology. It still remains to describe the purposes of school and teacher psychologies.

At present there are two concepts of school psychology. Firstly, it is conceived as a minor form of educational psychology, with its purpose being to study the psychological foundations of education and upbringing in school. This is the broader concept of school psychology. Secondly, it is conceived as the science of professional school psychologists. Its purpose is to study and investigate methodological questions, the possibilities of professional application of integrated psychological knowledge, techniques and procedures in school. The research results of school psychology would be applied directly in schools by professional psychologists — school psychologists. An analogy is to be found between clinical, business, sports and military psychology, etc.

In many countries, Czechoslovakia among others, up to the present time the needs of teacher psychology have been more-or-less supplied by educational psychology, school psychology or psychology for teachers.

Teachers, educators and other educational staff form perhaps, with university-level education, the most numerous group of working intellectuals in the great majority of countries. There are engineering, medical, military, astronaut and other psychologies. Why should there not also be teacher psychology?

The purpose of teacher psychology is not, for the time being, strictly defined. This results from the complexity of the teacher's status. Its purpose is determined by social requirements, through basic educational documents such as curricula and syllabuses. In Czechoslovakia the curricula for future teachers at the teacher training faculties of universities prescribe the essentials of four psychological disciplines. They are: general psychology, developmental psychology, educational psychology and social psychology. The prescribed syllabus is drawn from among these disciplines and the end product is called 'teacher psychology', or 'psychology for teachers'.

The situation has quite a different aspect when we consider whether this is correct or not from the point of view of teacher psychology as a scientific discipline. The selection of the material making up teacher psychology should undergo serious scientific reflection. Teacher psychology cannot simply be a

composite of these isolated disciplines. There is an analogy with a medical faculty, where they do not teach chemistry, physics or biology, but rather medical chemistry, medical physics and medical biology.

It follows from what has been said above that teacher psychology is a special psychological discipline whose purpose is to investigate psychological notions and those aspects of psychology that can be most helpful for teachers, and to assess their correctness and usefulness through constant scientific verification directly through educational practice in schools.

THE SYSTEM OF EDUCATIONAL PSYCHOLOGY

The structure of every inter-disciplinary science is determined by two aspects. The first aspect follows from practical requirements, in our case the practical requirement of the educational process. The second aspect follows from the momentum of development in that particular science. In our case it is the inherent characteristics of development in educational psychology. After all, even the second aspect aims at promoting educational practice, but this assistance is not direct and pursues further, more remote objectives of educational phenomena.

The system of contemporary educational psychology is not uniform. There are many reasons for this lack of uniformity. The following are the most important of them:

1. *Different concepts of the purpose of educational psychology.* Those authors who consider educational psychology to be an applied psychological discipline, applying the knowledge of general psychology to educational phenomena, obviously use the system of general psychology as a starting point for approaching educational psychology. The same is true of those authors who consider the purpose of educational psychology to be the application of the outcomes of developmental psychology to educational phenomena, who, in this case, use developmental psychology as their starting point. As has already been pointed out, we consider neither of these approaches to be correct.
2. *Vagueness concerning the position of educational psychology in the system of psychological and educational sciences.* The authors who consider educational psychology to be an educational discipline stick to the educational sciences even when writing a university textbook.
3. *Vagueness as to whether the textbook is intended for experts in psychology or for practical educators* (teachers and tutors); the systems differ accordingly.

4. *Inadequate preparation of many educational-psychological problems.* This is due to the fact that educational psychology, as an independent special psychological profession, is still relatively young. It has achieved its independence within the psychological sciences only in recent decades.
5. In many countries there are still no established posts for educational psychologists in schools. This means that there are no practical psychologists who would provide advance warning and discover scientific solutions to psychological problems in educational practice.

These are, amongst others, the basic causes for the lack of uniformity in the system of educational psychology.

NOTES AND REFERENCES

1. Bain, A. *Erziehung als Wissenschaft* [Education as a science] Leipzig, 1880.
2. Freud, A. *Pudový život dítěte: psychoanalýza pedagógov* [Instinctive life of the child: Psychoanalysis of educators] Praha, Volné myšlienky, 1937.
3. Adler, A. *The education of children.* New York, 1930.
4. Ďurič, L. *Úvod do pedagogické psychologie* [Introduction to educational psychology] Praha, SPN, 1979.
5. Ďurič, L.; Grác, J.; Štefanovič, J. *Pedagogická psychológia* [Educational psychology]. Bratislava, SPN, 1988.
6. Jiránek, F. Specifičnosť pedagogicko-psychologického javu [Specificity of the educational-psychological phenomenon] *Československá psychologie* (Praha), 1, 2, 1957, p.132.
7. Pardel, T. Pedagogická psychológia [Educational psychology]. Bratislava, SPN, p. 42.
8. Rubinštejn, S.L. *Základy obecné psychologie* [Essentials of general psychology] Praha, SPN, 1964, p. 33.
9. Příhoda, V. *Úvod do pedagogické psychologie* [Introduction to educational psychology] praha, SPN, 1956, p. 15.
10. Kelemen, L. *Pedagógiai pszichológia* [Educational psychology] Budapest, Tankönyvkiadó, 1981.
11. Jiránek, F. Vztah pedagogické psychologie a pedagogiky [Relationship of educational psychology and the science of education] *Jednotná škola*, (Bratislava), roč. 17, čís. 3, marec 1965, p. 244-261.
12. Mialaret, G. *Introduction to the educational sciences.* Paris, Unesco, 1985, p. 63.
13. Stephens, J.M. *Educational psychology.* Rev. ed. London, Constable 1956.
14. Bruner, J.S. *O podstate a problémoch vyučovania* [On the substance and problems of instruction] Bratislava, SPN, 1968.
15. Levitov, N.D. *Základy pedagogickej psychológie* [Essentials of educational psychology] Bratislava, SPN, 1951, p. 18.

CHAPTER TWO

Special issues of educational psychology

THE PSYCHOLOGICAL FOUNDATIONS OF EDUCATION

The educator (in the broadest sense of the word) is responsible for personality development and the purposeful training of children, young people and adults.

As a rule, teachers and educators have already undergone university education. Nevertheless, in practice they are often faced with some basic issues to be solved in the process of education and upbringing. These are as follows: Are parents, teachers and educators capable of training the personalities of children and young people in accordance with social requirements and their own qualifications? Does education play any role in this training or is the individual's future predetermined by hereditary factors? Are we then helpless against these hereditary factors? These are the questions raised not only by the theory, but, first and foremost, by the practice of education.

The issues of people's psychic development are explored by individual psychological disciplines from different aspects. They are studied by educational psychology, the purpose of which is to investigate, discover and explain the psychological foundations of the process of education and upbringing. Educational psychology examines these issues particularly from the point of view of the psychological foundations of the purposeful, intentional and planned development of man. Our starting point suggests the notion that only knowledge about the substance of these issues will provide the scientific basis for influencing man's education and behavioural patterns.

The biological determination of personality development and the training of man

In the past, certain views were expressed which considered that the main determining force in an individual's personality development was the bio-

logical factor. These views underestimated environmental factors, especially the social one. On the other hand, there were other authors who underestimated the biological factor and concentrated on the social factor — often thought to be constant — as the only determining force in man's psychic development. The struggle between these contradictory views was of long duration.

The biological determinants of man's psychic development include: the activity and characteristics of the nervous system and the sensory organs; the activity of the endocrine glands; the growth of the organism; the overall and momentary physical state; biological needs and instincts; heredity; innateness; and certain defects and diseases.

Disagreements between psychologists were focused mostly on questions of heredity, or its influence on the development and formation of man's psyche.

Under the term 'heredity' we understand the tendency of an organism to preserve and to transmit the parents' features and characteristics to posterity.

The first expert in the field of heredity is considered to be the cousin of C.R. Darwin — F. Galton (1822-1911), who in 1869 published the book *Hereditary genius*, very often quoted in this sphere.

Galton postulated two laws concerning heredity among people:

1. The law of filial regression (parents of above-average height have smaller children and parents of below-average height have taller children). This represents a regression to average.
2. The law of the hereditary share of ancestors (children inherit one-half of their characteristics from their parents, one-quarter of their characteristics from their grandparents, one-eight from their great grandparents, etc.).

We are interested in questions of heredity concerning psychic characteristics. Galton even investigated these issues, namely questions involving the inheritance of abilities and talent. He presumed that famous people were also extraordinarily capable and gifted, and that their outstanding abilities were inherited. He identified talent with social status. He alleged that life in society is similar to life in nature in that only individuals with outstanding abilities break through and succeed, in spite of the obstacles.

Galton's theory was criticized by one of the founders of Soviet psychology, M.B. Teplov [1], who pointed out methodological errors and shortcomings that led to incorrect conclusions. Teplov held a similar viewpoint to the research of K. Cox and L.M. Terman.

Cox, under the leadership of Terman, undertook to find out from what kind of families (occupation of the father) the most famous historical figures came from between 1450 and 1850. She selected the most famous people from

Cassell's dictionary. She excluded all persons with insufficient biographical data, as well as sovereigns and the established aristocracy, who inherited their ranks. She ended up with 282 famous men. According to the occupation of their fathers, they came from the following social groups: the fathers of 52.5% of famous men were noblemen and intellectuals; 28.7% were semi-intellectuals, tradesmen and independent farmers; 13.1% were skilled workers and retailers; 3.9% were semi-skilled workers; and 0.7% were unskilled workers.

Teplov criticized the selection of the famous people in this 400-year span, as well as their order in Cox's list. It is strange that E. Burke, an activist in the British political party called the Whigs (later the Conservative Party) appeared in sixth position, while such great names as Darwin, Beethoven, Kopernik and Bach occupied 68th, 121st, 192nd and 269th positions respectively!

L.M. Terman [2] lived in the United States where there were no royal or aristocratic families. He also investigated the social origin (occupation of the father) of gifted children. After detailed testing, the following findings were obtained: the fathers of 31.5% of the best pupils were intellectuals; 50.0% semi-intellectuals and tradesmen; 11.8% skilled workers; 6.6% semi-skilled workers; and 0.13% unskilled workers.

Another author who approached the question of heredity through the investigation of pedigrees was H.N. Goddard. In one town it was noticed that some low-class and anti-social inhabitants had the same surnames as some families of high repute. After studying their pedigrees, he found that both groups had a common ancestor (Goddard gave him the nickname Martin Kallikak from the Greek *kaloc* = 'good' and *kakos* = 'bad'), who on the basis of the recorded data had been on terms of intimacy with a mentally-retarded woman. They had a son who was equally mentally retarded, but had many descendants. Goddard investigated 480 of them and found out that only forty-six of them were mentally normal, 143 were mentally retarded and the others had questionable intelligence. Among the group of sub-normal individuals were twenty-four notorious alcoholics, thirty-five sexual deviants and three convicted criminals. The report on Goddard's research was presented by S.S. Sargent [3].

Later on, Martin Kallikak married a mentally normal woman. This union resulted in 496 descendants and, with the exception of three persons, they were all mentally and socially normal. Goddard came to the conclusion that the degeneration of the first group was due to the hereditary influence of the mentally-retarded mother. He did not take the influence of bad environment into consideration for the first group, nor the influence of the environment enjoyed by the descendants of the second group.

Another sphere of research on hereditary influence concerning the development of man's psyche is represented by studies on identical twins, i.e. born from one fertilized ovum. Identical twins have the same hereditary skills.

In connection with the heredity of intelligence, the relation (correlation = r) between the intelligence quotients (IQ) of parents and children, and between the siblings to one another were investigated. The following findings were obtained: between parents and children $r = 0.58$; between siblings of various ages $r = 0.53$; between binovular twins $r = 0.63$; and between identical twins $r = 0.88$.

These correlations are high. One could ask if this is the result of heredity, or if it is influenced by the family environment. Research conducted so far suggests that monozygotic (identical) twins are more alike in their intelligence than the ordinary (dizygotic) twins, which tends to support the influence of hereditary factors. In other studies, it was shown that if the identical twins did not live in the same environment their IQ correlation coefficient was 0.77.

Human genetics is still faced by many unknowns. The relationship between inherited and inborn intelligence and acquired intelligence will be dealt with in more detail in another part of this work. However, one point seems to be certain: the link is not straightforward, and only hereditary information (genes) is transmitted directly. All the important chemical, structural and functional traits of the organism are to a certain degree dependent on genes. The genes located in the chromozomes of the cellular nucleus represent the developmental programme of the organism, deposited in the molecule of desoxyribonucleic acid. It is acknowledged that this acid forms the material basis, i.e. the genetic starting-point, of development.

The development of man does not start at the time of his birth, but at the moment of conjugation of the ovum and the sperm, with fertilization. A zygote is formed, the starting-point of development. The zygote contains hereditary information, yet it is liable to the influence of its environment. Intra-uterine development of the foetus is then influenced not only by the hereditary characteristics of parents and ancestors, but also by the influence of the mother's body.

What is then inherited? It is rather difficult to answer this question, because after birth the child brings to the world not only hereditary traits, but also those acquired during the development of the foetus in the mother's body. Therefore we cannot identify hereditary traits with inborn traits. The term innateness is of broader significance than the term heredity. The inborn traits include hereditary skills, as well as the traits and signs that originated during the development of the foetus in the uterus.

It cannot be denied that the general signs of species and races are inherited. From embryonic cells of man only people arise; from the embryonic cells of white men, white men and women are born; and from embryonic cells of black races, black men and women are always born. The blood group is also inherited. Certain physical and mental diseases are inherited as well, e.g. haemophilia (improper clotting of the blood that may cause bleeding to death). This

fact was known already to ancient Jews and therefore the Talmud (the Jewish religious code) forbade the circumcision of new-born boys when the brother or the uncle of the mother suffered from haemophilia. Some forms of lip and palate fissures are also inherited. Among mental defects are, for example, the oligophrenic states (debility, imbecility and idiocy).

The new-born child inherits from its ancestors certain anatomical-physiological characteristics or skills that make it possible to form its psyche. Here lies the multi-potentiality for personality development. It is generally known that at birth man is the most helpless of all creatures on earth. No other animal is dependent so much and for so long on the care of adults (parents or foster-parents) as man, but no other animal has such potential for development as man. Even the inherited characteristics make man different from other animals, which creates the possibility for men to be trained, to behave and to be educated in accordance with the objectives of society.

Certain biological determinants of the psychic development of man are also transmitted hereditarily. Among others, they include the following: specific human traits of physical organization, especially the structure of the brain, its architectonics, the specific fields of the cortex of large hemispheres, the special structure of analysers, the functional properties of the nervous system, especially its unusual plasticity, making it possible to form innumerable new and complex temporary neural connections and to reflect the surrounding world in all its complexity. Hereditary character includes the primary biological functions associated with the instinctive reflex movements. On the basis of these needs, new secondary needs may arise, historically, in the process of human development, as well as the possibility of evolving new forms of activity and various psychic characteristics.

Inherited characteristics have an inevitable influence on an individual's psychic development. Similarly, as with plants and sub-human animals, the hereditary factors for man have great significance. With plants and animals these factors are often the decisive ones for development. With man it is different. What we inherit from our parents and ancestors are just potentials for the development of our psyche; they are not ready-made psychic traits.

In concluding our discussion on the biological determination of man's psychic development (especially the influence of heredity), it is necessary to mention the fact that the exact degree of influence of hereditary factors on personality development is still unknown. One of the principal tasks of human genetics is to make this problem clear.

The influence of the social environment on personality development and the training of man

Those proposing biological determination of the development and formation of man's psyche already met opposition from their contemporaries. Often

quoted in this connection is the statement by the American psychologist and behaviourist J.B. Watson to the effect that:

> Give me a dozen healthy, shapely children and a specific world in which to educate them and I can guarantee that I shall make any of them a specialist to my own choice: physician, lawyer, artist, successful businessman, or even beggar and thief, without respect to his gifts, tendencies, interests and the race of his ancestors.

This statement clearly indicates an overestimation of the environmental influence and an underestimation or denunciation of biological factors in the development of man's psyche.

Views overestimating the influence of the environment are rooted in the attitude of the preceding centuries. Most of all they are influenced by the ideas and statements of John Locke (1632-1704), the culminator of Bacon's empiricism who, in his *Essay on human understanding*, demonstrated that the mind of a new-born man is like that of a blank tablet (*tabula rasa*).

The above views and the ones derived from them represent the extremes, denying the mutual interaction of organism and environment. They consider the environment as something constant, independent of men, affecting the psyche automatically, by its very existence, without man being able to react.

The social determination of development in man's psyche represents the most natural human determination. Without other people, man would not be able to become a person in the proper sense of the word. As evidence, we can refer to cases where young children were, due to some accidental circumstance, left without human company, as 'jungle babies'. The child needs the company of other people, of adults, otherwise he/she will not even be able to learn to speak, since speech is acquired on the basis of imitation. Social activities are inevitable for the development of man's psyche. The influence of the social environment on man's psyche is not, however, a mechanical, self-redeemable and overwhelming influence. Social influence would count for little if it were not realized in active co-operation with the developing individual. Here we are face to face with the dialectical principle of the unity of organism and environment.

The social determination of development and formation on man's psyche includes the following factors: social customs, ethical norms, laws, taboos, human activity, etc. However, their influence is not always organized, appropriate or desirable. Therefore, these kinds of social determinants are referred to as elemental influences. In spite of this, there is *one* social determinant for the development of man's psyche which represents a purposeful, planned and systematic influence. This social factor is called 'education' and the environment in which it is realized is called the 'educational environment'.

Figure 2 shows how developmental psychologists conceive the relationship between heredity and environment in the lifelong course of personality formation, according to the Czech psychologist J. Švancara [4].

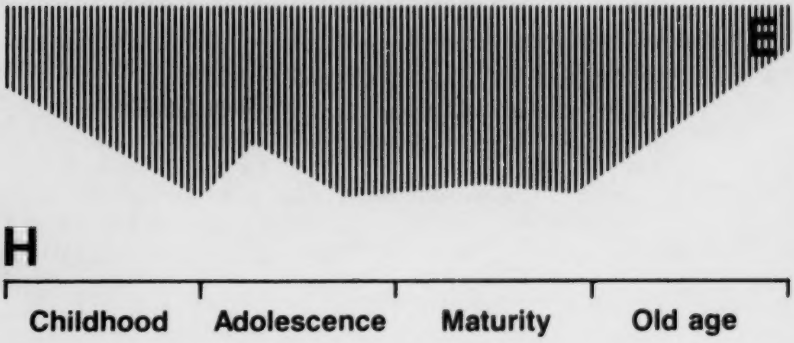

FIGURE 2. Schematic illustration of the share of heredity (*H*) and environment (*E*) in the lifelong development of man, according to J. Švancara

It may be deduced from the diagram that at the beginning and at the end of ontogenesis the factors of heredity dominate environmental factors. It is bicategorial, that is, a biological-social model.

The extreme representatives of heredity considered hereditary factors to be decisive determinants in the development of man's psyche, while the extreme representatives of the environment claimed that only the environment determined the development of man's psyche. The evolution of scientific thought has confirmed that both of these views are untenable. Aware of this, the German psychologist W. Stern (1871-1938) [5] attempted a kind of synthesis between these two theories in the form of the so-called 'theory of convergency'. According to Stern, personality is the result of inborn and acquired traits. In describing this theory G. Clauss and H. Hiebsch stressed that it was based on the so-called parallelogram of powers, based on the model of mechanics, according to which the resultant of two sets of powers is a certain effect. They go on to argue:

> This initial clear conception is, however, a mechanical one and therefore false. The conception that hereditary gifts or environmental influences (either educational measures or activity) are forces that act upon the object simultaneously, i.e. the child, from the outside, thus developing its abilities and traits, is untenable. Such a theory considers the child only as an object or a puppet affected by different forces, while in fact the child is the subject of its own development [6].

Nowadays the view is held that, with the help of adults, the developing child is a joint creator of its own personality, respecting hereditary and inborn characteristics. By its own activity (play, learning and work) the developing child regulates its own development, its own behaviour in individual stages of ontogenetic development. Therefore, besides the biological and social determination of development in man's psyche, we should also include the psychic regulation of behaviour, i.e. the self-formation of an individual's personality.

We should mention in this connection the words by A.N. Leontiev [7] which stressed that the foundations of man's personality do not represent his genetic dispositions and destiny, acquired habits, knowledge and capabilities, but the system of activities realized as a result of this knowledge and these capabilities.

Psychological problems due to the self-formation of man's personality

The psychic development of man is neither the unique outcome of biological factors, nor the unique result of the influence of social factors. G.S. Kostjuk characterizes the development of man's psyche as follows:

> We have arrived at the conclusion that the mental development of personality cannot be conceived as an inert process, propelled by an external, alien force, but as an 'auto-motion', a spontaneous, internally inevitable motion; only in this way may a truly scientific theory of this development be built [8].

Pardel [9] characterizes the relations between biological and social determination of behaviour on the one hand and between the psychic regulation of man's behaviour on the other. Psychic regulation represents the highest level of behaviour regulation in man. Pardel divides the psychic regulation of behaviour into two groups:

Unconscious psychic regulation of behaviour, which is connected especially with biological determination of behaviour. This group includes: inborn reflexes (unconditioned), inborn instincts, inborn individual gifts for intellectual development, inborn defects. It also covers automatic acts, habits, etc. They are subject to maturation and learning. As a consequence their influence differs in individual developmental periods.

Conscious regulation of behaviour represents the second, the highest group of psychic regulation. Referring to L.S. Rubinštejn, Pardel states that the unconscious experience changes to a conscious one when man understands the object being aimed at.

Linhart [10] attributes the decisive significance in psychic regulation of man's behaviour to those mechanisms and psychic systems that arise in the process of learning. The psychic regulation of man's behaviour makes it possible to

look for and find the optimum strategy and construct a clear programme of activity.

With advancing age these mechanisms and structures of psychic regulation of man's behaviour are gradually developed, formed and improved, particularly as a result of the purposeful intervention of the social environment on the individual's psyche (i.e. the educational environment and, later on, self-improvement and self-education).

On the basis of summarizing several models determining man's personality development and formation, D. Kováč has drawn conclusions which are illustrated on a psycho-reflexive-regulatory personality model [11] as shown in Figure 3.

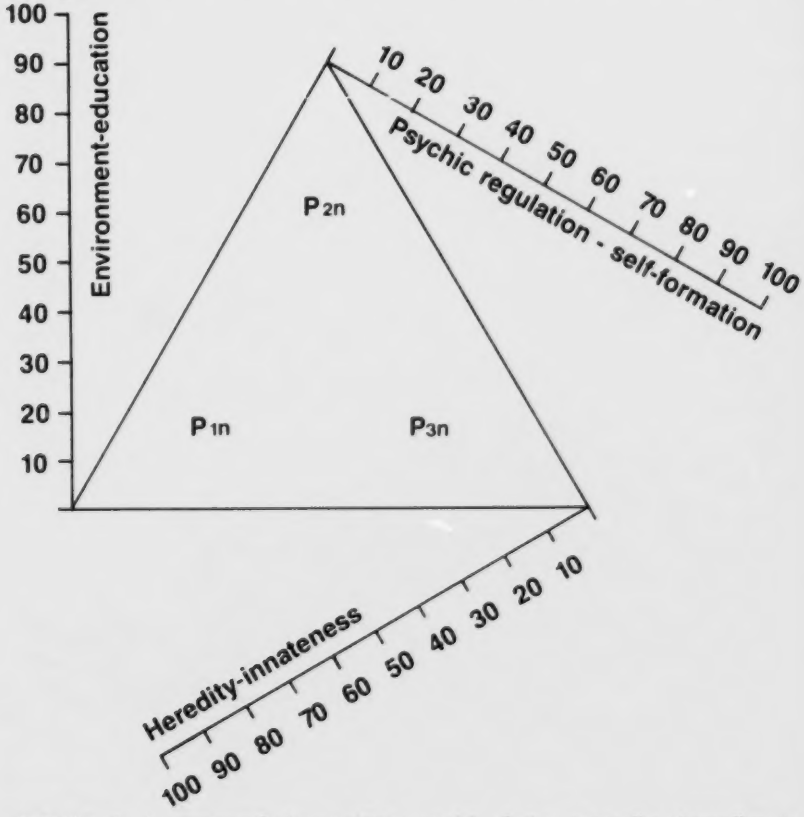

FIGURE 3. A psycho-reflexive-regulatory model of the personality (according to D. Kováč).

According to the author, the model assumes three basic sources of the origin, formation and functioning of personality: (a) an endogenous source (heredity-innateness); (b) an exogenous source (environment-education); and (c) a psychic source (reflexive-regulatory). On the basis of these three sources, three extreme types of personality can be identified:

Rudimentary personality ($P_{2:n}$) that originates and functions primarily on the basis of heredity and innate resources, with a smaller contribution by the environment and education, and a minimal role played by psychic functions in its relative stabilization. This type of personality is little subject to the influences of the environment (even the social one) and education.

Adjusted personality ($P_{2:n}$) is formed primarily by external influences (environment and education), with a certain degree of development of some specific dispositions and partial self-constitution.

Cultivated personality ($P_{3:n}$) results first of all from the operation of psychic functions (self-formation by means of self-upbringing and self-education). This extreme type used to be called an 'autodict'

Maturation, learning, development and education

A child is born as a creature of nature, but with the multi-faceted potential to become a social creature. He/she is born as a human being, but only gradually does a unique personality evolve. A decisive role in the process of transformation to a personality, i.e. a social being, is played by learning, which is, even so, to a certain extent conditioned by factors of maturation during individual age periods. It is therefore necessary to mention the problem of relation between maturation and learning, even though learning will be dealt with again in more detail in a subsequent section.

Maturation and learning. In the process of 'growing up' or 'maturation', the organism is considered to be an internal factor of development with a genetic and, in general, a biological component.

Maturation is a developmental process and its determinants come mainly and predominantly from the dynamics furnished by the internal conditions prevailing in the system. Regulation of the process of maturation lies in the characteristics of the human organism, formed in phylogenesis and anthropogenesis, but influenced by external conditions in ontogenesis. The views of psychologists on the processes of maturation and learning differ.

There are psychologists (representatives of heredity as a key factor in development) who consider biological maturation as the decisive factor in the personality development of man, without any substantial influence from learning. There are others (especially some behaviourists) who hold the

mechanical view according to which development is determined by external influences, while the individual remains passive.

Many experiments have been conducted in this field. Their results are not unambiguous. However, they confirm the fact that during early infancy growth is of the greatest significance and the processes of maturation seem to proceed with a view to future learning processes. The process of maturation then prepares the ground for learning processes and the learning processes condition further maturation. The difference between maturation and learning is only a relative one, in practice, i.e. in real development, they form a unity.

Clauss and Hiebsch demonstrated this unity, but at the same time a relative difference between maturation and learning during the development of child speech; the unity, but also the difference, between babbling and speech learning. The babble (at about six months of age) enables maturation of speech organs. In order to babble, children do not need any specific external stimuli. This can be seen from the fact that at the age of six months even deaf children start to babble, even though they cannot hear either their own babbling or adults' speech.

Learning is one of the significant factors of development. The child matures mentally by learning (either in an organized way, i.e. by directed learning, or in a piecemeal way). Learning, however, must respect the level of maturation of the child. Maturation and learning form a dialectical unity in pesonality development.

Relations between development and education

Understanding the problem of psychic development of the personality and its relation to education and, on the contrary, the influence of education on personality development plays an important role both from the theoretical point of view as well as from that of practical needs.

Psychic development is conceived as a quantitative and qualitative change of personality traits, the gradual increase of abilities to reflect the surrounding world appropriately through active functioning. The process of psychic development is a process of active coping of the organism with the surrounding environment, the outcome of dialectical co-operation of internal processes and external influences.

Intellectual development is then perceived as a dialectical unity of two operating processes, namely the educative processes (in the broader sense of the word), having the character of social influence, and the processes of spontaneous motion (automotion), being controlled by internal laws. Both of these processes interact and together they condition the intellectual development of the personality.

In discussions among Soviet psychologists and educators (1957-1958), most controversies concerned the problems of spontaneous development, automation of development and internal laws of development. A.N. Leontiev [12] considered the spontaneity of psychic development of the child as a process of automotion — change in a continuous flow of the child's activity, leading to the strengthening and development of participation in the surrounding environment.

Zankov [13] (1958) elucidated the problem of spontaneous development (automotion) as one of the factors of development on the basis of Lenin's works. He points out that spontaneous motion of development takes place on the basis of a struggle among inner contradictions conditioned by external factors.

Denying the inner contradictions as a source of psychic development leads to the metaphysical conception of development.

Another discussion concentrated on problems of the 'internal laws' of psychic development in man.

Some participants in the discussion expressed fears that recognition of internal laws of psychic development permits the introduction of indeterminate tendencies into development and, at the same time, negates the dependence of psychic development on external and social, and especially educational, factors.

The majority of the participants in the discussion held (and still hold) the view that automotion of psychic development is realized according to its own internal laws, determining certain stages, a certain periodicity of development, depending upon the age specifities of the developing human being.

Recognizing spontaneous development of the psyche and of its internal laws follows both from the principle of biological and social determination of psychic development, as well as from the principle of psychic regulation of man's behaviour. It is the very psychic regulation of behaviour that is controlled by psychic, i.e. internal, regularities. This kind of conception of psychic development of man will protect us from 'education without the child', from an overestimation of the effects of education and from non-respect of the inner contradictions and internal laws of pupil's development.

The personality development of pupils consists of a dialectical contradiction between the achieved level of functional efficiency of their psyche and the tasks set by society, especially by education. Intellectual development means constantly resolving these contradictions.

The psychic qualities in individual developmental stages do not arise by themselves, but even the social environment the child lives in does not impose its mechanism on the psyche.

At the beginning of this section we stated that psychic development of man is realized by two processes: the process of spontaneous automotion (controlled

by its own internal regularities) and the process of education, having the character of a social influence.

Education represents a decisive external factor on pupil's personality formation, respecting the biological (hereditary) endowment. In deliberate training of the pupil's personality, it is necessary to take into consideration the simultaneous and mutual operation of biological and social factors. It must be mentioned, however, that education cannot be identified with 'development'. The process of education is studied by the educational sciences and its respective disciplines, while psychic development is explored by the psychological sciences, especially ontogenetic psychology. The psychic development of a pupil and psychological progression in an educational environment are researched mainly by educational psychology.

In the psychic development of man, as well as in development in general, the reasons for encountering phenomena are always the result of inner contradictions. The inner contradictions in man's psyche do not arise by themselves but, after their appearance, they became internal forces that provoke psychic development. The inner contradictions may be conditioned by educational influences. They may be, for example, contradictions between new notions and old views, between personal capacities and personal ambitions, between 'heart' and 'head', etc.

Education represents the most fundamental, the most decisive external influence on psychic development in man. However, education does not form man's psyche directly, but creates activity among pupils or students by means of which their psyche becomes developed. This is the basic task of education and there lies the central role of the teacher in the educational process.

The relation between development and education is a dialectical one. Development of the psyche constitutes a prerequisite for education and education constitutes a condition for progress in development. Nevertheless, the psychic development of a child is also conditioned by other factors, especially other social factors, yet education remains the most important social activity for intellectual development.

To conclude our discussion of the relation between development and learning, it may be said that education, as a key external factor in an individual's psychic development, is regularly connected with its internal spontaneity. However, all that is internal is conditioned from the outside, but nothing inside the psyche may be immediately elicited by external influences alone, including educational ones.

Educational-psychological problems of educability

The solution of educational-psychological problems of educability is of primary importance for both the theory and practice of education and upbring-

ing. It determines the influence of education in personality formation or human development. If the power of education is overestimated while other factors in an individual's development are under-estimated, we talk of the so-called 'educational optimism'. The extreme representatives of educational optimism, the French eighteenth century materialists, attributed omnipotence to education, as if it were only education that determined an individual's intellectual development. However, by the same token, there also exists 'educational pessimism', underestimation of educational influence in the development of man. The dominant influence is attributed to other factors of psychic development and there is not much confidence in the power of education. Both of these extreme views are incorrect. Modern educational science supports sober educational optimism, stressing the key significance of education in man's personality development. This standpoint is based on the findings of biology, neurology, physiology and psychology, and, last but not least, on the practical experience of teachers and educators. Creative educational work is of use only when there is confidence in the decisive influence of education on the personality development of man in resolving inner contradictions. Scientific research in the field of physiology and neurology has in recent decades revealed the actual foundations of educability in the form of the law of plasticity, i.e. the possibility of the nervous system, especially the brain, to be shaped or formed. The most important representative of the doctrine of plasticity concerning the nervous system was I.P. Pavlov and his disciples. The potential plasticity of the central nervous system provides great possibilities for educational influence.

The plasticity of a child's central nervous system does not represent a kind of wax that can be remodelled all day and every day according to the teacher's whim. The child as a subject of educational activity does not represent a material that would submit to everything and anything. The central nervous system is a coherent self-regulating system, controlled by its own logic. The education of man can be successful only when it is based on the knowledge of this logic. This is a general approach to the problem of educability in man.

The genetic aspect or approach to the problem of educability is based on the notion that immediately after birth man appears as a plastic creature, open to the world.

Great plasticity in the central nervous system at particular stages of a child's growth and in the process of acquiring maturity is also conditioned by the biological growth of the brain during these periods. The weight of an adult's brain represents approximately 2 per cent of the body weight; with a new-born child this ratio is much more in favour of the brain, since it represents 12 to 14 per cent of body weight.

The increase in a child's brain weight is more rapid in the first months and years of life. By the end of the first year of life the brain weight has increased

two-and-a-half times and by the end of the third year of life four times. The increase in brain weight is greatest in the first year of life.

Growth in size and weight of the brain practically ceases around the age of 14 years, when it reaches the weight of an adult man's brain (approximately 1,429 grams). These growth and developmental tendencies suggest that education should concentrate on personality formation as soon as possible. Education should start from the first weeks of a child's life in all spheres where the maturation of the nervous system permits and enables it.

Psychological problems of educational influence

The objective of education is to educate complex, harmoniously developed personalities, people who participate actively and creatively in the construction of society.

The education of a multi-faceted personality represents a very intricate process. The intricacy of education (in the broader sense of the word) is caused first of all by the fact that in its realization there are still frequent contraditions between educational objectives and reality, between the endeavours of the school and the family environment, between purposeful educational activity and adults' behaviour.

The intricacy of education is also complicated by the fact that, in practice, teachers or educators have to deal with the personalities of many different individuals. Every individual possesses his/her own character — unique — each one influencing the outcomes of educational activity to a certain extent.

General psychological analysis of educational influences

If one human being influences another human being, and if this influence causes a change in the latter's psyche, we talk of a psychic influence.

Psychic influence may be either direct or indirect.

When one person influences the psyche of another person or a group of people (e.g. parents influencing children) directly, without any link in between, we talk of direct, immediate psychic influence.

Influencing the psyche of other people through the products of one's own work is called an indirect, mediated influence. This is the case, for example, of creative artists, scientists or journalists, who influence the psyche of other people through their work.

That is one aspect of psychic influence. The other aspect consists in the reaction of people to that influence. This is a very complex aspect. The complexity of the reaction to psychic influence is attributable to the fact that, between the influence and the reaction to it, the whole intellectual life of the

reacting individual intervenes. The same educational actions do not elicit the same reaction in all children; even the reaction of one person to the same educational influence may not always be the same. Certain rewards or punishments may evoke different reactions from the same person under different conditions and circumstances.

Even in this sphere the principle of determinism operates, as described by L.S. Rubinštejn [14]: 'Psychic phenomena, as with all natural phenomena, are determined, incorporated into a general mutual relationship of material world phenomena.' Yet the question of determining people's reactions to psychic influence remains a very complex one. To become acquainted with it, it is necessary to study the background of psychic life, since the reactions of man are determined by the outside world only indirectly, by means of man's intellectual activity. 'Outside influence has a certain psychic effect only when it is refracted in a subject's psychic state, in the system of his thoughts and feelings' [15].

An individuals' reaction to psychic influence may be either negative or positive.

Negative reactions to psychic influence may appear in two forms: active negativism or passive negativism.

When the individual reacts to psychic influence by actively opposing it, we talk of 'active negativism'. This reaction is represented by stubborn and defiant behaviour by the child or pupil, directed against the action of its parents or teachers.

When the individual reacts to a parent's or a teacher's influence passively, by an apathetic attitude, we talk of passive negativism. Externally it looks as if the individual acts neither against nor in favour of the influence. He behaves indifferently, as if it did not concern him. Passive negativism can be summed up in the phrase 'like water off a duck's back'.

Positive reactions to psychic influence are witnessed by an individual's active support of that influence. Even positive reactions may have two forms.

It may happen that externally the individual may appear to react to the influence, but without inner conviction. He may do so in order to please the parent, the teacher or the youth leader, or because he is obliged to, but internally he does not agree with it. He is not internally convinced of the correctness of their influence. In such a case the individual seems to react positively, but remains passive within.

The most positive form of reaction by children and young people (not to mention adults) to psychic influence arises when, on the basis of inner motives and convictions, they comply with the requirements of psychic influence. When an individual reacts in this way to the psychic influence of teachers, parents, educators and other educational workers, it forms the psychological foundation of successful education.

Educational influence is also a kind of psychic influence, since it causes a change in the psyche of the targetted individual. However, it is a special and qualitatively higher form of psychic influence. The objective of educational influence is to bring about a planned, purposeful and systematic change in the individual's psyche. Psychic influence itself usually lacks these qualities. With psychic influence, the change in man's psyche simply arises: with educational influence, it is planned and programmed.

Psychological specificities of educational influence

Educational influence, as the major form of psychic influence, exhibits some particular characteristics.

The first characteristic of educational influence is its purposefulness. Education is carried out with a view to achieving precisely defined objectives. All the processes of education and upbringing, in school and outside it, are designed to achieve these goals.

The second characteristics of educational influence is its ability to evolve. Every correct educational influence aims at and promotes the development of an individual's psyche. This development is two-fold: development of content and functional development (development of functional efficiency of the psyche).

The development of content means the enrichment of an individual's psyche with knowledge, skills, habits, aesthetic and moral experiences, as well as other personality traits.

However, the development of content is also dependent on the development of its functional efficiency. From the psychological point of view the development of functional efficiency in the individual's psyche represents a very complex process, forming an inevitable prerequisite for the development of content. This means that the level of development of functional efficiency in an individual's psyche also determines the development of content. The higher the level of development of functional efficiency in an individual's psyche, the better are the conditions for acquiring content. There is a consequence for educational practice, namely that the educational requirements must correspond to the development of pupil's psychic capabilities.

Psychic influence is thus faced with the individual's unified, integrated psyche, having its own qualities. Training may only be successful when these qualities are respected. If education is conducted properly, the development of content and functional efficiency in the pupil must take place at the same time. Through developing the functional efficiency of the psyche, it is expected that there will be a similar effect in raising the level of content requirements on psychic activity, i.e. further content development. In school practice, for example, this is reflected in the fact that when the subject matter is presented in

a syllabus and the educational outcomes established, the pupil is quite capable of achieving them successfully, at the same time as developing the functional efficiency of the psyche and making it possible to raise the level of subject matter or educational requirements to be achieved in the future.

To sum up, we can say that the development of functional efficiency in the individual's psyche, in close relation to the structural maturation of the brain, is an inevitable prerequisite for content development of the psyche, while content development becomes a condition for the further development of functional efficiency.

The third characteristic of educational influence represents its bi-polarity. The educational process is carried out as a bipolar activity, i.e. it has two components. One component represents the teacher or educator, the other component the child or pupil. Educational activity is complicated by the fact that the parent, the teacher or the educator influence a young person, whose psyche is constantly being developed according to its own biological and psychological qualities and, first of all, under the influence of educational manipulation. Therefore, educational influence should take both of these factors into consideration.

The bi-polar nature of educational influence was not always correctly interpreted or respected. In the Middle Ages and at the beginning of modern times educational theory and practice laid almost complete emphasis on the teacher's activity. At a later date, another extreme attitude laid stress almost exclusively on the pupil's personality (pedocentrism).

Bi-polarity of educational influence should be conceived as mutual cooperation between two components, i.e. the mutual influence of the teacher's educational activity and learning activity by the pupil. Education without the pupil is of no consequence. It gains importance only when it keeps pace with an individual's development. Similarly, an individual's development in human society is unthinkable without the educational influence. Both components of educational activity are mutually dependent. The adult acts upon children and young people in a planned manner and thus forms their personalities. But even the developing child reacts upon the adult. The more the personality of a young individual evolves, the higher are the requirements on the work of the teacher, parent, educator, etc.

EDUCATIONAL-PSYCHOLOGICAL PRINCIPLES OF EDUCATIONAL INFLUENCE

Educational influence and the reactions evoked by it are subject to certain educational-psychological principles. Knowledge of these principles helps

educators in their work. The most essential psychological principles of educational influence are the following ones:

1. The principle of changing external influences into internal motives.
2. The principle of active co-operation of the pupil with the teacher's educational influence.
3. The principle of upgrading the effect of educational influence through social influence.
4. The principle of the soundness of educational influence.
5. The principle of raising the effect of educational influence through the personality of the teacher.

The principle of changing external influences into internal motives

We have already mentioned that the highest and most desirable way in which the pupils can react to educational activity is when they act on the basis of their own inner motives and convictions in accordance with the educational influence of the teacher or the parent. The point is that education should also take into account the pupils' internal attitudes. Nowadays the view has gradually become accepted that the specificity of education does not lie exclusively in the teachers' activity, but also in the fact that educational influence should be based on an evolving and ever more conscious involvement on the part of the pupil. The pupil does not represent a passive object undergoing the influence of the environment and education. Social and educational influences are not automatically projected into the pupil's psyche. The development of the pupil's psyche is noted for a certain 'spontaneity'. According to S.L. Rubinštejn [16], it is not then correct to maintain that 'the change of external conditions of life, without education and internal efforts, would solve everything concerning the inner profile of people. The life conditions represent an inevitable, but not unique, condition for training the inner profiles of people.'

In connection with the analysis of this problem it is necessary to answer the following questions:

- What are the internal attitudes of the pupil's personality which refract external causes?
- What is meant by the change brought about by external influences on the internal attitudes of the pupil's personality?

Internal attitudes of the personality were analysed by the Soviet psychologist S.L. Rubinštejn [17]: 'In the explanation of any psychic phenomena the personality appears as a network of internal attitudes, through which all external influences are interpreted.' According to Rubinštejn the main task of psychology is to explore the qualities of these internal attitudes.

The internal attitudes of the personality's psyche have a phylogenetic, anthropogenetic or ontogenetic character.

The internal conditions formed in phylogenesis and anthropogenesis are first of all inherited and inborn properties of the nervous system. However, they are not ready-made abilities, but only inherited dispositions with potential for development.

The child is born with a relatively highly developed nervous system. At the same time, he is born with organic needs that stimulate him towards activity. The internal attitudes formed during ontogenesis of the personality include the interiorization of external causes. They incorporate all that has been learned by the personality during its life. From the inside they then influence the efficiency of further external influences.

The transformation of external influences into internal attitudes represents one of the key issues in the psychology of educational influence and pupils' reactions to it. The point is: how can external influences be transformed into the pupils' own inner convictions?

Any task or educational requirement presented to the pupil by the teacher or parent will only become a driving force for activity if the pupil accepts it, when it becomes his/her own task and when the pupil desires to accomplish it. As stressed by Rubinštejn, education which confines itself to setting tasks and is satisfied with their formal fulfilment on the part of the pupil is without prospects. Educational influence should aim at the inculcation of such inner efforts on the part of the educated individual corresponding not only to the letter but also to the spirit of moral requirements expected by society.

However, the problem is how to ensure that educational requirements are changed into inner motives, into a driving force for the pupil. There are cases when this interiorization is relatively easy. The external objective set before the class, e.g. a summer camp, a trip abroad, etc., may evoke such enthusiasm as to guarantee its successful realization. In this case interiorization is easy and quick. But this is not always the case. With interiorization of a summer camp or a trip abroad, the project met with the spontaneous interest of the pupils, i.e. the existing internal attitudes were ready to accept the external requirement and transform it into an internal attitude.

Interiorization of external influences often requires persistent work by the teacher, based on psychological knowledge, particularly knowledge of the pupils' psyche.

The basic prerequisite for an educator's success is the ability to find out what interiorized attitudes and properties the pupil already possesses in a particular sphere. The effect of educational influence is always dependent on internal attitudes confronting the educator's activity. Inevitably, the educator's individual approach to every pupil, based on familiarity with their personality, is important.

The principle of the pupil's active co-operation with the teacher's educational influence

This principle follows from the bi-polarity of educational activity and, in order to be successful, it is necessary for the teacher to be familiar with the pupil's inner attitude. Since a child's development takes place on the basis of external causes and the inner attitudes of his/her psyche, educational influence can only be successful when it elicits the pupil's active co-operation. Without such co-operation we cannot speak of true education, but rather more of a drill. This, however, does not exclude lower-level educational influence aimed at the cultivation of certain automated, stereotyped behaviours (especially at an earlier age) concerning habits, customs, skills, etc. The rate of efficiency of educational influence is reflected in the extent of spontaneous activity elicited in the pupil, leading to self-education. The key is teacher/pupil interaction.

Teacher/pupil interaction means that the pupil is not a passive creature, nor a passive receiver of the teacher's educational influence. The pupil can be the subject of his own training under the teacher's leadership. The younger the pupil, the greater is the dependence on the teacher's guidance. Gradually this influence changes both in quality and quantity. The pupil evolves, and the interactions assume different forms.

The quantitative changes of interaction may be illustrated in a very simplified form as shown in Figure 4.

The diagram shows that the older the pupil the stronger the influence of feedback on the teacher, especially in the form of asking questions and in problem-solving situations.

The diagram shows the teacher/pupil interaction in a simplified form. In practice the situation is much more complex, since it is a group educational activity, i.e. the teacher does not influence one pupil only but all the class, and the teacher is not influenced by one pupil only but by all of them. These relations become even more complex in the upper grades of elementary schools and in secondary schools where each day and each week pupils are taught by several teachers.

The principle of stepping up educational influence through social influence

The relationship between educational and social influences is very close. Education is influenced by the social life around it and, on the other hand, society is affected by the people within education, but especially by education itself. For example, it is impossible to inculcate moral principles without taking into consideration people's lives, traditions, customs and habits. However, external factors alone, without education, will not change people's attitudes. Educational influence is in substance a social influence, since — as we

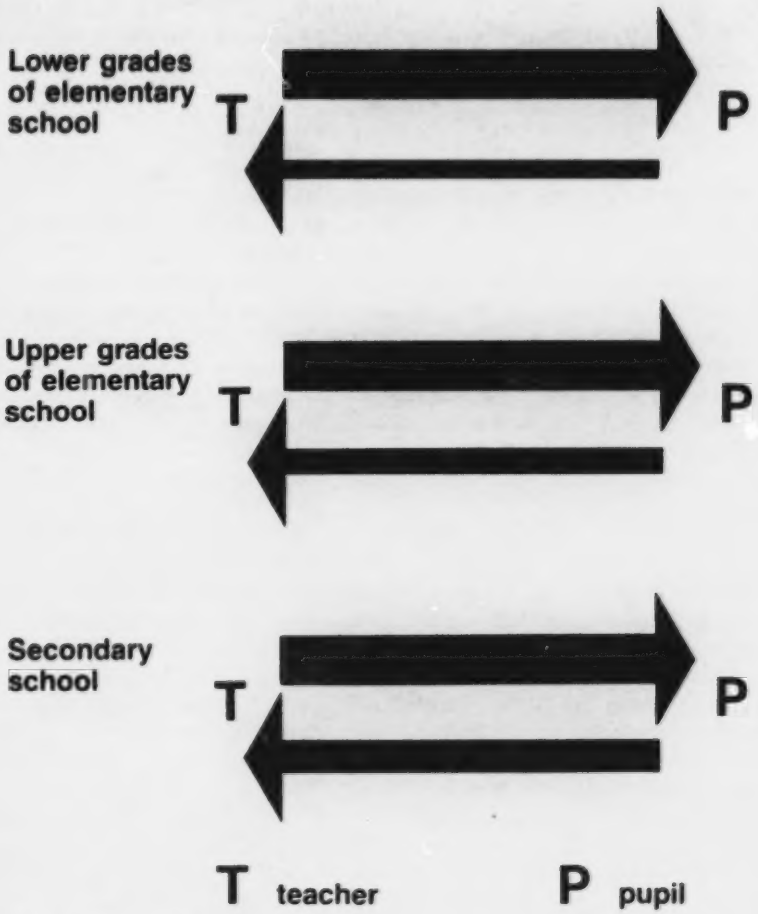

FIGURE 4. Quantitative changes in teacher/pupil interaction during formal schooling

already know — it is through education that society influences its members, especially children and the younger generation.

The relationship between social and educational influences may sometimes encounter anomalies. Cases may occur where the behaviour of individuals contradicts the educational objectives of the school. Such individuals may reduce the efficiency of the school, leading to unhealthy developments in the

pupil's personality. It is the task of educators to educate parents and the public as well so that all such contradictions are avoided and the efficiency of educational institutions is gradually increased.

The principle of the soundness of educational influence

This psychological principle stresses the requirement for the educational influence exercised by the teacher to respect the actual characteristics of the pupil. The practicality of educational influence follows from the variety of educational situations in the school, class or family. The inconstancy of educational situations requires that educators should be ready to adjust their approach accordingly. To take a simple case, if the teacher punishes a pupil unjustly, that pupil will become a martyr in the eyes of the class, and the effect of the punishment will be contrary to the teacher's intention. In respecting this principle the teacher must take into account: (a) the age characteristics of pupils; (b) the momentary situation in the group of pupils; (c) the individual characteristics of every pupil.

The principle of raising the efficiency of educational influence through the teacher's personality

All teachers and educators exert educational influence through their entire personalities, thus influencing the development of pupils or students. This means that the whole life and behaviour of the teacher should reinforce the efficiency of the educational activities. The teacher's behaviour must be consistent with the behaviour expected of the pupils, especially as far as performance and efficiency are concerned. His/her deeds must be in accordance with educational requirements. If this is not the case, educational influence may decline or completely vanish.

For the pupils the teacher is a representative of society. It follows that the teacher may only be successful when supporting progressive ideas and opposing obstacles to progress. Great educators of the past possessed these qualities (Pestalozzi, Locke, Komensky, Makarenko and others), and this is why they were able to influence the younger generation. It is a psychological principle that since young people are very sensitive to all that is new and revolutionary they can be motivated by the latest ideas — with a multiplier effect.

The moral ideal must correspond to the historical context of social development and to the most important contemporary needs. Progress in social development should receive support.

If the teacher's educational influence is to be successful, the pupils must respect him/her; the teacher must be a figure of authority. In such a situation the effect of educational influence will be increased.

PSYCHOLOGICAL FOUNDATIONS OF MORAL EDUCATION

The most essential objective of education in all educational institutions concerns the inculcation of moral values. The task of moral education in school is to organize, plan and purposefully foster the formation of moral awareness, moral attitudes and moral behaviour in pupils.

The process of forming the pupil's moral values should respect a certain progression and the gradual development of the pupil's psyche will determine the type of moral education given. This means that the moral education given to children aged 6 and aged 15 should differ.

In educating younger children, especially of pre-school age, we aim at the formation of habits and customs containing the elements of morality and forming the foundations on which to build later. At this age the child does not act on the basis of consciousness and conviction. Behaviour is still more-or-less instinctive.

However, in moral education, that is to say the moral formation of man's personality, one should be prepared to aim for higher ideals. Mere moral consciousness is not enough. It is not sufficient to be aware of a certain moral norm and to approve it. To achieve the objective of moral education it is necessary not only to be aware of moral norms, but to transform them into an inner conviction, the inner motive of man's activity. The inculcation of moral conviction represents the subsequent phase of moral education. The final objective is to achieve moral behaviour and values based on moral consciousness and conviction. Moral behaviour and values represent the criterion by which man's character can be judged.

It follows from the above that the process of moral education with respect to developmental phenomena in the child's psyche proceeds from simple, elementary moral habits and customs up to conscious moral behaviour and conduct on the basis of inner values. This process is a very complex one. An important role is played by moral attitudes and the will.

From the psychological point of view the following phenomena should be developed in moral education: (a) elementary moral habits; (b) moral consciousness; (c) moral conviction; (d) moral behaviour and conduct; (e) moral values; (f) expressions of will-power.

Psychological foundations of elementary moral habits

The behaviour of the pre-school-age child is not governed by moral consciousnes and inner conviction. Moral education should start at the earliest age, however, in an appropriate form. The most suitable educational method at the pre-school age is the formation of customs and habits providing a foundation for the development of man's morals. At this stage the child cannot

be aware of and judge the correctness or incorrectness of conduct and behaviour, but the cultivation of appropriate reflexes and habits strengthens conduct and behaviour in accordance with the requirements of the social environment. The pre-school-age child does not clearly perceive the outcome of its activity. At the best it knows that a certain deed is good or bad, since that is how the parents and teachers evaluate it. At this stage it is inevitable that the child's conduct and behaviour should be directed. Parents and teachers must aim at the formation of attitudes leading to the fulfilment of tasks, overcoming difficulties, telling the truth, greeting and thanking others, observing the rules of decent conduct at table, showing respect for adults, keeping things tidy, etc.

From a psychological and educational point of view it is necessary to kow how reflexes and habits are learned. This is as follows: (a) the younger the child, the faster are habits established; (b) the more one becomes accustomed to habits and customs, the harder it is for new ones to be introduced, since they are faced with the resistance of the former; (c) the older the habit, the more firmly it is established.

When the habits and customs of moral behaviour are instilled in the child from an early age, they become the permanent basis for moral behaviour throughout life.

Moral habits and customs have tremendous influence not only on the life of an individual, but also on that of the community. Good order in the family, infant's school or primary school may be cultivated and maintained only on the basis of many positive moral habits and customs that have become internalized by each member of the community.

Since these basic moral habits and customs cannot be formed in a tiny child on the basis of conscious activity of the will, they must be learned on the basis of imitation and constant repetition. There lies the difference between the moral habits of children and those of adults, which are inculcated on the basis of moral consciousness and conviction.

Psychological foundations of moral consciousness in pupils

Moral education does not stop with the formation of elementary habits and customs appropriate to the development of children's psyche at the pre-school age. At primary school it is necessary to start with inculcating moral consciousness among pupils.

At the end of the pre-school age or at the beginning of primary school, children gradually start to evaluate their deeds and those of others. They begin to form notions of good and bad, of useful and harmful. Even though these notions are initially very simple, they start to form the basis for evaluating one's own correct or incorrect behaviour, as well as that of others. At about the

time when children are beginning primary school moral education can no longer be based exclusively on passive obedience; it is necessary to start with the formation of a moral consciousness.

Moral consciousness represents a particular form of consciousness in man. According to S.L. Rubinštejn [18] '...from the psychological point of view consciousness represents first of all a process in which man becomes aware of the surrounding world and of himself. The inevitable prerequisite to achieve anything is a certain complex of notions on the basis of which man becomes aware of his environment.'

Moral consciousness is formed on the basis of moral concepts and judgements. We cannot talk of full moral consciousness unless pupils are aware of the basic moral concepts and unless they are able to judge in concrete terms the deeds of other people, or of themselves, from the moral point of view. Acquisition and full understanding of moral concepts presents great difficulties to children. As we move on to pupils in the higher grades of elementary schools there are great differences in comprehending moral concepts. N.A. Levitov [19] presents pupils' answers to the question: what does the concept 'manliness' mean? The pupils of the seventh grade answered that it was a heroic deed, the pupils of the eighth grade that it was a person's ability to devote himself to the cause of his country, and pupils in the tenth grade answered that it was, for example, when a scientist was prepared to die to defend his ideas.

Pupils may have difficulties in evaluating moral conduct and behaviour. They often restrict some of the moral requirements stipulated by the teacher to behaviour within the school, somehow excluding the outside environment. Other shortcomings in the evaluation of moral behaviour by children include the fact that the child often judges the deeds of others on the basis of external results and not on the basis of inner motives. As an example, one could describe the pupil who tries to help his friend with his homework but happens to spill ink over the exercise book; the other pupils may judge this act only negatively, without appraising the positive intention.

Another characteristic frequently encountered in the evaluation of moral behaviour is high subjectivity in the initial stages of developing moral awareness. This subjectivity is manifested in different ways. For example, the child may admire the moral qualities that he himself lacks, since he is sensitive to their absence. Another form of subjectivity is manifested in the fact that the children may be unable to evaluate their own deeds according to the same criteria that they employ for the deeds of others.

From the psychological point of view the teacher's task in the education of pupils' moral awareness is the gradual implanting of moral concepts through comprehension of their importance, and by doing away with the differences between one's own and someone else's deeds, thus removing subjectivity from the evaluation.

Psychological foundations for inculcating moral principles

Moral awareness is still not a guarantee of pupils' behaviour. There are frequent cases when a pupil (sometimes even an adult) is acquainted with moral norms and is able to judge activities on the basis of moral principles, yet does not act always and under all circumstances according to these principles. Moral norms and principles must become basic personality traits, penetrating the consciousness and transformed into an inner conviction.

Moral education should attempt to inculcate moral principles. When moral concepts and behaviour evaluations no longer represent mere knowledge, but originate from motivation, i.e. the driving forces behind behaviour and conduct, we may speak of moral principles. The teacher must ensure that pupils not only acquire moral notions and concepts, but make them the foundations of their moral principles.

The goal of every teacher and educator must be the inculcation of moral precepts in pupils guiding all their behaviour. The most fundamental condition for achieving moral principles in a pupil is to be associated with, to participate in and to be sympathic towards events taking place in society.

One of the main objectives to be achieved through education for moral principles is the development of an international perspective among pupils, since it is a world-outlook that motivates a person's activity.

The education of moral principles is a long and intricate process. Teachers and educators must be familiar with its psychological foundations.

First of all it is necessary to take note of the contradiction that may arise during the education of moral principles, either between the pupils and the surrounding world or in the psyche of the pupils themselves. An example of such a contradiction may be seen when the pupil — an adolescent — sees himself/herself in a different light from that in which he/she is perceived by adults (teachers or parents). An adolescent may considers himself/herself to be adult, but parents and teachers may continue to treat him/her as a child; or the pupil is asked to be thorough, assiduous and persistent in study, while those who require it are not themselves so inclined. Such contradictions distort the formation of a pupils' world-outlook. These external contradictions may be transferred inside the pupils. In such a case there may occur two (or more) mutually contradictory motives of behaviour and it is not always easy for the pupil to reconcile them. Overcoming contradictions represents an important stage in acquiring moral principles.

Proper moral principles are always based on a thorough comprehension of the value of the deed, of the truthfulness of the act. In the opposite case, we could not talk of moral principles, but rather of a blind, non-objective fanaticism. It is therefore impossible to develop and form higher humane moral principles on the basis of adults' dogmatic influence, remote from logical

considerations. Moral principles must have their logical foundations. Moral principles must have their logical intellectual aspect. The power of truth is of greater educational efficiency than constant, stereotyped, dogmatic moralizing. It is clear that the application of this logical, intellectual process should conform to the children's level of mental development.

In the education of moral principles educators must try to make use of children's imagination and fantasy. This means that, if principle is to become a driving force of behaviour and conduct, educators must present moral objectives to pupils in a practical and flexible form. The teacher should fully appraise this aspect and not simply concentrate on the logical aspect. The most convenient form of presenting moral objectives in a practical way is through positive ideals in children and youth. The child needs an ideal and should not be denied this spontaneous need. If the child is not given an ideal by the educator, it may find one for itself, which may not necessarily be the most appropriate one. Therefore it is very important to choose ideals for children and young people that embody the moral qualities that education wishes to foster. The choice of ideals requires careful thought on the part of educators. They should represent permanent moral qualities, serving as expressive examples, worthy of being followed throughout life. Persons who serve as models for young people may be found in sufficient numbers both in the past and the present.

Another important requirement in the formation of moral principles is for the educators not to consider the pupil as one of a group, but as an individual pupil. Moral principles can only be inculcated when the educator takes into consideration the inner needs of the pupil. Otherwise the external requirements are not interiorized, they are not transformed into an inner conviction. All moral requirements must be internally accepted, so that all man's behaviour and conduct spring from his own internal motivation, his own conviction. According to S.L. Rubinštejn [20]: 'Education can only be completely successful when it can touch, partially disclose and develop, partially create inside the man the points of support for the chosen moral requirements.'

If in the formation of moral principles the particular internal attitudes of the child are not taken into consideration, the teacher is wasting his time.

The psychological foundations of moral behaviour and conduct

The moral profile of man is best manifested in his conduct and behaviour. Moral consciousness and principles cannot be identified with moral conduct and behaviour. There may even be contradictions between them. For example, the pupils are convinced that all teachers expect obedient and disciplined behaviour, yet they do not behave equally obediently with all of them. It often happens that with a less strict and demanding teacher the pupils behave in an

undisciplined manner, while with an authoritative and consistent teacher they behave obediently.

Of great importance for the education of moral conduct and behaviour are moral habits and reflexes. As children grow older their moral habits are based increasingly on inner motives of behaviour and conduct. The elementary moral habits and reflexes of an infant, learned by constant repetition of the activity or mere imitation of adults' behaviour, are no longer sufficient for older children.

The moral habits and reflexes of older children — pupils in the higher primary grades and in the secondary school — should be based on their personal consciousness and conviction. From the psychological point of view moral habits and reflexes have two significant aspects at this stage.

The first lies in the fact that, as habits become automatic, the conscious component decreases. To perform them no longer requires concentrated attention, since these familiar elements of behaviour automatically succeed one another on the basis of a dynamic stereotype. This is a great advantage, since the pupil's attention need not be fully occupied on such matters, but can concentrate on the purpose and content of behaviour and conduct instead.

The second aspect lies in the fact that through them human activity becomes more efficient, less demanding in energy. Well-established habits and reflexes do not place great demands on man's psyche and they facilitate successful activity over longer periods of time.

The inculcation of moral habits and reflexes requires a planned and systematic procedure. The point in moral education is not simply to provide training for one habit, but for a whole system, in which individual habits support and supplement each other. The formation of moral habits and reflexes represents the initial and final stages of moral education. The elementary habits of younger children represent the first stage of moral training. The moral habits and reflexes of young people and adults, based on their inner conviction (the motives of their behaviour and conduct), represent the final form of man's moral training. In both cases they are important factors in moral behaviour.

Moral conduct and behaviour are manifested in man's activity and it is through this activity that they are also inculcated. In order to promote moral conduct and behaviour among young people in school, educators, teachers, parents and workers should strive to make the working environment an educational environment as well, corresponding to educational objectives.

Psychological foundations for the formation of moral attitudes

The education of attitudes, especially moral ones, is one of the most important tasks of the teacher and educator within the frame of moral education. Two

basic tasks for the teacher in this connection are to encourage positive attitudes and to guide and re-educate negative ones.

Positive attitudes are best inculcated when the pupils have an opportunity to observe people's behaviour corresponding to moral norms. Schoolchildren should therefore be faced with situations spontaneously eliciting their emotional involvement. For example, a good means of education for a community spirit is when the child becomes involved in a merry group of playing children.

When teaching moral values to children it is very important that the teacher himself or herself has a rich resource of generous feelings. The most essential moral values should concern an affection for children and satisfaction with the profession. The teacher who likes children will also like the chosen occupation and will all the more easily overcome difficulties occurring during work.

The teacher who really likes both the profession and the pupils very quickly acquires the correct educational approach. Educational approach means respect for the personality of every pupil achieved through a paternalistic relationship. The teacher who is satisfied with the pupils and the profession very quickly wins their confidence and affection as well as that of their parents.

In teaching positive attitudes, the teacher's manner of explanation, his/her voice and the ability to act are all very important. The teacher must be able to rouse the pupils' feelings, not, however, by resorting to sentimentalism or various artificial devices. The most important point is that the teacher believes in what he/she is saying and doing.

Another important phenomenon in the education of positive attitudes is represented by their relationship to real life. For example, patriotism may be successfully taught by means of examples of heroes of the past and present. Well-organized debates by pupils on the life and work of important personalities of the past and present are very useful. Such events are most suitable on the occasion of national holidays and anniversaries.

In teaching moral attitudes, the educator should look for support through the imagination and fantasy of children and young people. Literature, film and theatre have the advantage that they arouse positive attitudes, such as firsthand experience, vivacity, dynamism, emotional tension, the victory of truth, etc. Prose, poetry, film and theatre provide a good source of emotional education for pupils.

The most suitable basis and source of moral attitudes among pupils is always from their own activity, either in school or outside it. However strongly the pupils experience in their imagination and fantasy the fates of literary, theatrical or film heroes or heroines, the feelings aroused by bringing to completion their own activity are much more profound. These feelings are of great importance since the pupils will do their best to experience the same feelings

again in the future. It is the satisfaction of work well-done that may serve as the basis for a future occupation and the feeling of responsibility in general. Educators must aim at creating an atmosphere for school work that leads their pupils to use such words as 'I like s hool', 'I like going to school', 'I like to learn', etc. If pupils 'like to go to school' and 'like to learn', they are well-prepared for 'liking' their work even after leaving school.

In educating for moral attitudes educators must take into consideration the sequence of developmental progression. One of the basic characteristics in the development of moral attitudes is their gradual extension from objects and phenomena in the immediate and inner world of the child. As an example we propose the development of the child's attitude towards people. In the infant this positive feeling is first evoked by the mother, her tenderness and care. As a child develops, feelings towards the mother becomes more profound, but at the same time extend to other persons, at first other family members, but later neighbours, nurses at creches, teachers in kindergartens and schools, colleagues, etc., finally including many known and unknown people, according to the code of moral norms in the society the child is living in. Teachers should help to extend the moral feelings of the child on the basis of their knowledge of child development.

In moral education it is not only the formation, extension and reinforcing of pupils' positive feelings that is in question. In practice, teachers are often faced with the need to remove, suppress and re-educate negative attitudes. Experience has shown very clearly that it is easier to educate positively than to re-educate negative attitudes. In substance, re-education means the suppression of negative attitudes and their replacement by positive ones.

It often happens that the cause of pupils' negative attitudes (anger, envy, hatred) represents a reaction to an apparent injustice or misunderstanding. When the educator succeeds in revealing the causes, it is easier to remove their consequences, i.e. negative attitudes.

The educator should be aware that, in the struggle against negative attitudes, prohibition and punishment are of no effect, since they only arouse further rejection. Thus they are themselves negative methods.

The most efficient way of opposing negative attitudes is to confront them with positive ones. There is no use in fighting selfishness by constantly pointing out its harmful and immoral aspects. It is much more efficient to base the fight on the feeling of a community spirit, which occurs in one or another form and to varying degrees in every pupil. With the help of the class group, this positive attitude will certainly overcome the negative one.

Psychological foundations of educating will-power

A significant position in moral education belongs to the question of will-power. The pupil often understands the correctness of the rules laid down by

parents, teachers and educators, and emotionally agrees with the moral principles but, if the will is not sufficiently strong, at the first collision, with the first obstacle, he or she gives up. A lack of will-power on the part of a pupil does not create conditions for the fulfilment of tasks set by the school, while the consequences for future life are especially bad.

By the term 'will-power', we usually understand a human being's ability to overcome obstacles standing in the way of attaining a set goal.

From the psychological point of view, the content of will-power behaviour is very complex. If the child is not born with a strong will, it must be inculcated, together with other aspects of character. Generally, four basic groups of will-power traits are distinguished. They are as follows:

1. *Purposefulness*, which must conform to the moral code of conduct and behaviour accepted by society. This means that the aims set for a human being's activity should reflect both personal aims and those of society. Teachers should encourage schoolchildren to establish noble aims for themselves. It is very important that aims are clear and concrete, since only such aims will be capable of motivating the pupils. These aims may be both short-term and long-term. Short-term aims must contribute to the achievement of long-term ones.
2. *Initiative*. This trait of will-power behaviour manifests itself in decisiveness, courage and independence, both in setting aims and in their realization. Without initiative we cannot speak of a strong will. The task of teachers and educators is to support, educate and guide pupils' initiative. Teaching people to show initiative is of great importance in the formation of their personalities.
3. *Discipline* means that someone with a strong will can make conduct and behaviour conform to certain principles, that he/she can act in accordance with generally acknowledged norms and does not violate them irresponsibly. We are talking here about self-control. Learning at school and at home requires pupils to be able to guide and organize their own mental activity. The opposite case would result in anarchy.
4. *Perseverance*. Schoolchildren who have a long-term project to carry out need perseverance. This means the ability to finish a job, to fulfil the set aim. Will-power is measured according to whether one is persistent in one's work, whether one is able to persevere until the final stage is reached. This trait of the will should be inculcated in accordance with the development of functional efficiency of the psyche both in and outside the school.

Will-power is acquired only through activity. The educational process represents a rich source for the education of all facets of the pupil's will.

Education of the will is closely connected with the development of cognitive processes. The basic condition for the education of positive will-power among schoolchildren is represented by the proper organization of the educational

process both in and outside the school. Particularly influential in this respect is the pupil's daily regime, properly planned and accurately followed, as well as the habit of working in a planned and organized way.

The development of will-power among schoolchildren is negatively influenced by wrong or unjust evaluation of their endeavour and commitment to learning. Underestimation of the pupil's performance may result in the loss of self-confidence, in passivity and withdrawal of will-power.

Education should also take into account the fact that certain negative traits may appear in some pupils, such as impulsive behaviour and conduct. Impulsiveness is manifested by the fact that the activity of the child takes place without forethought under the influence of a whim. Another negative aspect of a pupil's will-power may manifest itself in the form of total conformity. A pupil may conform blindly to any influence from the other children and act accordingly, without questioning the reasons and wisdom of such behaviour. Furthermore, children may resort to stubbornness, which is very unwelcome since it may be difficult to overcome once it establishes itself. Weakness of will-power may also manifest itself as a lack of perseverance, which is usually connected with low commitment, as well as a low attention span.

These as well as other negative traits must be combatted in order that they do not develop into fixed behaviour. This is achieved through persistent educational work on the part of the teachers. The close and purposeful collaboration of the school and the family may be of great help in this remedial work, as well as the influence of the pupils' classmates.

To conclude this debate on the psychological foundations of education in favour of will-power, it is necessary to stress that, as with the education of any seemingly isolated characteristics, the objective is always the formation of a complex personality. The purpose of moral education is to make a significant contribution to the formation of character.

Character expresses the relationship of man towards reality and manifests itself in behaviour and conduct. Character is formed by the gradual strengthening of a system of impulses and motivations. This lengthy educational process, from the formation of elementary habits and reflexes up to conscious behaviour and conduct, through the inculcation of moral awareness and principles, takes place at the same time as the formation of moral attitudes and will-power.

PSYCHOLOGICAL ANALYSIS OF METHODS OF MORAL EDUCATION

In analysing the psychological foundations of moral education, we should identify those psychic phenomena which come to the fore at individual stages in the formation of the pupil's moral profile: elementary moral habits and

reflexes; moral awareness; moral principles; and moral conduct and behaviour. Methods of moral education will follow from these.

The educational sciences distinguish the following main methods of moral education: setting tasks; persuasion; exercise; reward and punishment; organization of the class.

Setting tasks as a method of moral education

The formation of the pupils' moral awareness requires the setting of objectives. The pupils become acquainted with moral norms by means of the method of setting tasks. The objectives establish the tasks to be fulfilled by pupils (order), or to be avoided (prohibition).

The teacher determines the tasks and objectives to be fulfilled by the pupils — their activity. The basic characteristic of the tasks is their energizing quality. The energizing force of the task may depend either on the teacher's leadership (authority, commitment, or the pupil's respect for the teacher), or from internal motives in the pupils themselves. The former case is typical of younger pupils, the latter of older ones.

At the very beginning (with younger pupils) only the basic aims of an activity may be outlined. Due to the limited development of the pupils' consciousness, the teacher may not include the reasons for that activity (for example, inculcating elementary moral habits). The fulfilment of such demands is still based on external authoritative factors. The pupils accept the teacher's project as their own only through gradual formation of their moral consciousness. Soon they start to understand the sense and significance of the project, and, later, each pupil starts to be more demanding towards himself/herself. In this way the external demands are gradually transformed into the pupils' own inner tasks and become an important factor in further training. Through a process of adaptation, the teacher's external demands gradually become the pupil's own inner demands (the process of interiorization).

In order that the teacher's tasks are adopted by the pupils, it is necessary to bear in mind certain psychic factors.

First of all it is necessary for the teacher's projects to accord with the pupil's level of development. Tasks that ask too much or too little are incorrect from the psychological point of view. In both cases the result is often the same: the pupil loses interest.

It may be necessary for the task to be broken down into its component parts. At first only the basic, global objective should be presented to the pupils. Fulfilment of the basic objective should gradually change to an obligatory task for all. First of all it can be divided into individual parts. For example, the global demand 'keep the school tidy' may consist of the partial demands: 'pick up waste paper', 'clean your desks before leaving the classroom', 'put all papers

in the waste-paper baskets', etc. The demand may also be broken down qualitatively, which means that, as part of fulfilling a more vigorous task, the pupils are first presented with its less exacting components. In this exercise care should be taken not to destroy the unity and integrity of the original task.

The importance of the task as a method of moral education lies in the fact that the pupils become familiar with purposeful activity, with the necessary discipline and with self-control.

Persuasion as a method of moral education

To form the pupil's moral principles, the teacher must use persuasion as well as setting tasks. The moral profile of human beings is determined by their ideological qualities, their views and principles, their world-outlook, and their deeds. According to J. Grác [21], the purpose of persuasion is to instil these qualities into the pupils' personalities.

The persuasion method aims at two objectives: partly further formation of moral awareness and partly the formation of moral principles.

According to L. Kelemen [22], the principal psychological criterion of the persuasion method is the accuracy of the data. Pupils cannot be persuaded by false, untruthful or imaginary data. False data, contradicting strict logic, will bring about the opposite effect to that intended by the teacher.

Another psychological requirement states that moral concepts and ideas should not be too abstract and thus unattractive, especially for the younger pupils. The teacher may bring moral education into the lives of the children by drawing on concepts and ideas from their own experience, from the school, the town, and its surroundings. It is very important to point out the social aspect of moral concepts and ideas.

The teacher must respect a certain progression according to the development of functional efficiency in the pupils' psyche. Yet again, it is necessary to respect the developmental characteristics of the pupils' psychic functions.

Lastly, one of the most important psychological requirements connected with the persuasion method requires the teacher to set a personal example to the pupils, as a representative of those moral ideas being instilled into them. The child is extraordinarily receptive to models and their imitation. From the point of view of education this is a significant factor. The point is simply that the teacher should really be a living model for the pupils to imitate.

Exercise as a method of moral education

The moral profile of man is formed in activity, through behaviour and conduct. By gradual, well-thought-out and consistent exercise the teacher may

bring the pupils to act and behave on the basis of moral awareness and principles.

Once again, the teacher should respect certain psychological requirements.

The first psychological prerequisite if exercises are to be performed efficiently is that they should be based on previously acquired elementary moral habits and behaviour, on moral consciousness and conviction. If the teacher ignores this fact, the endeavours may lead to a kind of 'obedient' behaviour and conduct, yet lacking inner motivation.

An important psychological requirement in the exercise of moral conduct and behaviour represents its consistency. It is not enough just to want to do something. The wanting and the decision must be followed by the deed. The pupils often decide that every day they will do their homework before allowing themselves some entertainment, but so often this becomes 'I'll start tomorrow', and 'tomorrow' never comes. The teacher must ensure that pupils proceed as soon as possible from good intentions to their realization.

Exercises should be systematic. If a daily routine is interrupted on a number of occasions, the whole preceding endeavour may be ruined. Frequent omission of certain activities from the daily programme (e.g. getting out of bed on time) will make their re-establishment rather problematic. The method of exercise should be appropriately used, especially during adolescence, for the self-education of young people.

Reward and punishment as methods of moral education

The aim of reward is to provide the child with moral satisfaction, to reinforce confidence and thus to evoke a desire to strengthen the achieved success and to repeat the praiseworthy deed in the future. The educational objective of punishment is practically the same, so that it serves first of all as a remedial method of education. The method of punishment aims at the cultivation of the child's ability to overcome and suppress its own wrong habits and tendencies.

Recent works in educational psychology point out the dialectical unity of reward and punishment. Merely defining the objectives of an activity may assume the character of judgement, since evaluation may be interpreted in terms of either reward or punishment. Besides, the terms 'punishment' and 'reward' should be conceived rather broadly. They may also be expressed as 'approval' and 'disapproval'. (Reward and punishment will be dealt with in detail in connection with learning motivation.)

Organization of the class as a method of moral education

The educational significance of an organized class is the fact that the pupils are taught to learn, to live and to entertain themselves together. A well-organized collective develops pupils' relationships and feelings of friendship, strengthens their will and forms habits and customs of unified and disciplined coexistence.

The significant features of a good community of pupils are as follows: uniform objectives; co-ordination of organized undertakings; uniform leadership; equal rights and duties of the members.

In the classroom the pupil can understand and evaluate himself/herself better, since behaviour and conduct are measured according to the generally accepted criteria of the class. In the true community the pupil will find means to improve behaviour and conduct; there will be examples of successful activity and models worthy of imitation.

Since education takes place in the community, the efficiency of the methods of moral education is to a considerable degree dependent on it.

The influence of the pupils' classmates is very powerful as far as good examples, and admirable habits of conduct and behaviour are concerned. The class often has a common ideal. The authority of the teacher and the method of evaluation are also subject to the public opinion of the class. Collective moral habits and customs are very strong, since individual pupils will gradually transform them into inner motives.

The efficiency of individual methods of moral education depends to a considerable extent on the overall educational climate, and the most important single factor in the school is the pupil's class. Therefore, if the activity of every teacher is to be successful, it is necessary not only to form a good community of pupils, but also to take into consideration their opinions, views and ways of thinking.

NOTES AND REFERENCES

1. Teplov B.M. *Schopnosti a nadání* [Abilities and talent] Praha, SPN, 1951.
2. Terman, L.M., et al. *Mental and physical traits of a thousand gifted children*. 2nd ed. Stanford, CA, Stanford University Press, 1926. (Genetic studies of genius, vol. I)
3. Sargent, S.S. *Základy psychologie* [Essentials of psychology] Praha, život a práce, 1947.
4. Švancara, I. Interaction of social and biological determination in the development and forming of the personality. *Sborník prací Filozofické fakulty Brnenské univerzity. I. Rada pedagogicko-psychologická* (Brno), roč. 17, 1982, p. 37-49.
5. Stern, W. *Die Intelligenz der Kinder und Jugendlichen und die Methoden ihrer Untersuchung* [Intelligence of children and youth and its research methods] 4th ed. Leipzig, 1928.

6. Clauss, G.; Hiebsch, H. *Psychológia detstva a dospievania.* [Psychology of children and maturation] Bratislava, SPN, 1970, p. 57.
7. Leontiev, A.N. *Činnosť, vědomí, osobnosť.* [Activity, consciousness, personality] Praha, Svoboda, 1978.
8. Kosťjuk, C.S. O vzájomnom vzťahu výchovy a vývinu dieťaťa hOn mutual relation of education and development of the child] *In:* Štúdie o procese mravnej výchovy. Bratislava, SPN, 1965, p. 93.
9. Pardel, T. K teoretickým otázkam problematiky 'vekových osobitostí' [Theoretical issues on problems of age specificities] *Sborník Filozofickej fakulty Univerzity Komenského Psychologica* (Bratislava) roč. XII/I, 1961, p. 5-22.
10. Linhart, I. *Psychologické problémy teorie učení* [Psychological problems of learning theory] Praha, NŠSAV, 1965, p. 228.
11. Kováč, D. *Teória všeobecnej psychológie* [The theory of general psychology] Bratislava, VEDA, ćsav, 1985, p. 228-229.
12. Leont'ev, A.N. Teoretičeskie problemy psihičeskogo razvitija rebenka [Theoretical problems of psychic development of the child] *Sovetskaja pedagogika* (Moskva), g. XXI, No. 6, ijun' 1957, p. 93-105.
13. Zankov, L.V. O probleme vospitanija i razvitija [The problem of education and development] *Sovetskaja pedagogika* (Moskva), g. XXII, No. 3, mart 1958, p. 103-114.
14. Rubinštejn, L.S. *Byti a vědomí* [Existence and consciousness]. Praha, SPN, 1961, p. 199.
15. Ibid.
16. Rubinštejn, L.S. *Zásady a cesty rozvoja psychológie* [Principles and ways of psychological development] Bratislava, SPN, 1953, p. 116.
17. Rubinštejn, S.L. *Byti a vědomí* [Existence and consciousness] Op. cit., p. 267.
18. Ibid., p. 240.
19. Levitov, N.D. *Detskaja i pedagogičeskaja psihologija* [The child and educational psychology] Moskva, Učpedgiz, 1960, p. 208.
20. Rubinštejn, S.L. *Principy i puti razvitija psihologii* [Principles and ways of psychology development] Moskva, Izd-vo Akademii nauk SSSR, 1958, p. 142-143.
21. Grác, J. *Persuázia* [Persuasion] Bratislava, Osveta, 1985.
22. Kelemen, L. *Pedagógiai pszichológia* [Educational psychology] Budapest, Tankönyvkiadó, 1981.

CHAPTER THREE

Psychological issues of teaching and learning

In this chapter we shall deal with problems connected with the psychology of guided learning in school. The principal issues involved are: general psychological problems of learning; kinds of learning; psychological learning theories; the laws of learning; learning methods (interaction between the teacher and the pupils).

GENERAL PSYCHOLOGICAL PROBLEMS OF LEARNING

Man, the most intelligent of all creatures, is born into the world as the most helpless, yet possessing the greatest potential for growth through learning. Mankind has been constantly learning something. Learning then represents the life 'deal' of man, from birth till death. The problems of learning have been the subject of intensive research in recent decades, especially from the point of view of psychology. However, learning is not represented by psychological aspects alone. It has also received attention from other sciences and scientific disciplines. Linhart [1] introduces eight aspects involved in an approach to the solution of learning problems: biological, physiological, psychological, cybernetic, social, epistemological, logical and educational.

Learning represents one of the most active and productive spheres of psychological research, especially as far as experiments are concerned. This is due to the immense practical significance of learning in general. Learning problems have motivated both practical researchers and psychological theoreticians.

There are authors who define learning as the process of an organism's adaptation to its environment. This is the 'adaptation concept of learning'. However, Leontiev [2] has already pointed out that the adaptive mechanisms of learning cannot be conceived simply as being quantitatively more complex in

people than in animals, based on the influence of language and various social institutions. According to him, what takes place in man is more than a quantitative increase in the complexity of adaptive processes, both as a species and as an individual. Therefore, learning in man cannot be explained on the basis of experimental results obtained with animals, not even when the factor of language is added.

In this part of the monograph we shall deal with learning in man. However, two kinds of learning must be distinguished. The first kind of human learning may be described as a specific activity, aimed precisely at the acquisition of something. It is intentional learning, e.g. the pupil sets out to learn algebra.

The second kind represents learning as the outcome of an activity designed to achieve another objective. Learning forms a component part of the activity. Historically, this kind of learning was always foremost. So that even in man we have to distinguish between a broader and a narrower meaning of the word 'learning', and within such a concept learning by man must be defined.

Learning, in the broader sense of the word, has been defined by Leontiev [3] as a process whereby the organism acquires individual experience. Learning takes place when the organism actively adapts to its environment by changing its behaviour. According to Leontiev the substantial element of human learning means taking over the experience of the species, the socio-historical experience of mankind. Learning not only evokes changes of behaviour in man, but also develops the personality.

This conception of learning considers the creative moment as the main characteristic of human learning, reflected in man's ability to train, evaluate and educate himself. This kind of learning helps to develop the ability to create, form and develop the personality.

The above definition of learning corresponds to that of general psychology. Educational psychology, however, defines human learning in a narrower way and describes guided learning more precisely. By this we mean pupils learning with the help of teachers and educators, i.e. under the direction, guidance and control of specially trained people. Later on, it may assume the form of directed self-education.

In the past, the definition of learning tended to be even narrower. For example, there were authors who considered learning only as the process of acquiring knowledge.

An extremely narrow concept of learning may lead to a certain bias and to imbalances in educational practice affecting the formation of the pupil's personality.

Let us take a closer look at Linhart's [4] general model of guided learning (Figure 5). The diagram represents general relations between the pupil (*P*), teacher (*T*), means (*M*), factors disturbing the process of learning (*D*), and the outcome, the effect of learning (*E*).

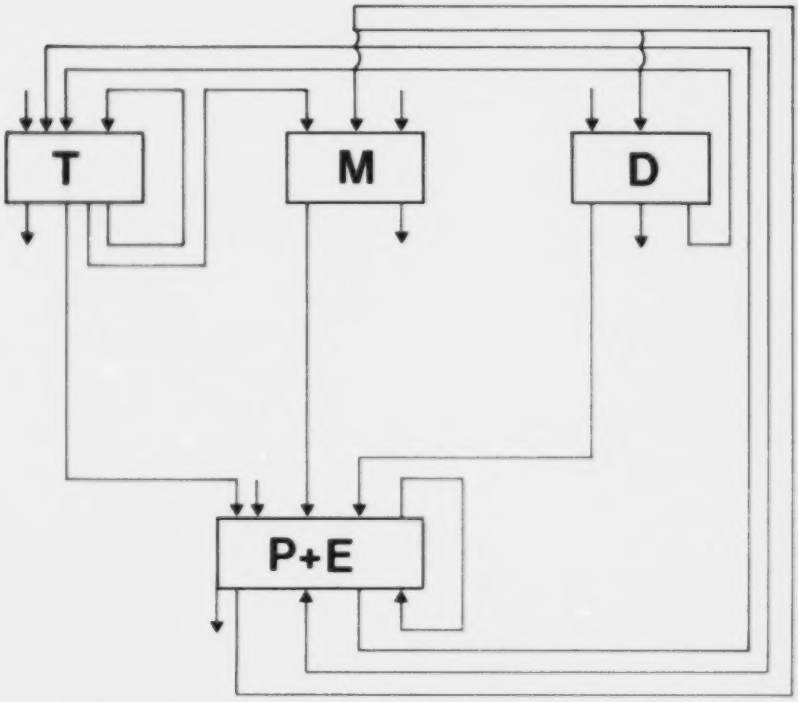

FIGURE 5. General model of guided learning according to Linhart

The diagram shows that the pupil (*P*) is influenced by the teacher (*T*), either directly or in a mediated way (*M*) or in both ways at the same time. The pupil is also influenced by disturbing, destructive influences (*D*) that may be of two kinds: external influences (noise, bad lighting, irregular daily regime, disturbed family life, etc.), and internal ones (illness, fatigue, disinterest, stress, etc.). The disturbing influences often detract from the objectives the teacher aims to achieve.

The struggle against disturbing factors, or at least to alleviate their harmful effects, may take two forms:

1. Creating appropriate circumstances, i.e. preventing the occurrence or alleviating the influence of disturbances.
2. Reinforcing the pupil's power to combat them, i.e. strengthening the will and motivation to learn. In other words, teaching the pupils how to learn even if the conditions are not always optimal.

The choice and use of teaching aids and methods will depend on the educational knowledge and skills of particular teachers. Nowadays, great progress can be reported even in this sphere due to the development of techniques and their application in school.

The diagram also shows that the pupils change their behaviour not only under the influence of external factors (T, M, D), but also under the influence of their own learning outcomes. This is demonstrated by the feedback circuit attached to the system $P + E$, as well as the control of information from $P + E$ back to the teacher (T). There is then both direct regulatory feedback where the pupil controls whether the required result has been achieved, together with feedback through the teacher where the effect (E) of the pupil's learning is compared with established learning objectives. Moreover, there are other links between the above components of guided learning which contribute to the control of learning. Of greatest significance is when the pupil finds out whether the learning procedure was correct or not.

KINDS OF LEARNING

In the psychological literature we can encounter various divisions for classifying learning. Linhart [5] divides learning on the basis of individual criteria. With respect to the qualitative developmental differences, he distinguishes between the learning of sub-human animals and human learning. Based on an analysis of the relation between play, learning and work, he distinguishes between direct learning (intentional), where an important role is played by the task (problem and exercise), and indirect learning (unintentional), when the person does not directly set out to learn.

We shall briefly analyse the following kinds of learning: (a) conditioning; (b) perceptual-motor learning; (c) verbal learning; (d) conceptual learning; and (e) learning by problem-solving. It is assumed that from the point of view of guided learning this division is a suitable one.

Conditioning

Conditioning is usually divided into classical or Pavlovian conditioning, and instrumental or Skinnerian conditioning.

1. *Classical conditioning* has been described and explained by the Nobel prize-winner I.P. Pavlov on the basis of his experiments with dogs. By his conditioned reflexes and their mechanisms, he managed to explain the most general foundations of learning (as a result, some authors consider classical conditioning as one theory of learning and not only as one kind of learning). The significance of Pavlov's conditioning lies in the fact that he pointed out

phenomena that helped explain mechanisms and concepts in the process of learning in general (temporary connection, extinction, irradiation, concentration, generalization, differential inhibition, etc.).

2. *Instrumental* (operant) *conditioning* is most frequently mentioned in connection with the experiments of E.F. Skinner [6]. Operant conditioning represents an elementary form of learning; its typical starting-point being learning by trial and error.

While there are some common elements, there is still a difference between these two divisions. On the basis of several works, the distinction between them may be illustrated by the fact that, with classical conditioning, immediately after the conditional stimulus (e.g. bell, light) the unconditional stimulus appears (e.g. food). When repeated several times a temporary nervous connection arises, a conditional reflex is formed, and the conditional stimulus evokes the same response (e.g. salivation of the animal) as the unconditional stimulus. With instrumental conditioning, the rat learns to press a lever and only afterwards the reinforcement (food) of the conditioned connection between the lever and its pressing follows. This means that with operant conditioning (contrary to the classical one) the conditional response has a different character than the unconditional one.

Another distinction between the two kinds of conditioning lies in the fact that with operant conditioning the target activity of the subject (animal or man) is made expressive. Obtaining the object of reinforcement or avoiding the object of threat depends upon the subject's conditional response. With classical conditioning the activity is under the control of the experimenter, while with operant conditioning it is under the control of the learning subject. Since this activity is typical first of all of people, operant conditioning may have a certain advantage for the description and analysis of some aspects of human learning.

This kind of conditioning is applied first of all to some forms of learning for infants. In this way the child, for example, acquires motor skills while handling a doll which makes a satisfying sound when pressed, or learns that lifting the cover of a box produces a pleasant tune, or turning a knob switches on the radio. By means of operant conditioning the child learns to stand. Once the trial is successful, on the basis of the law of optimum realization, the child tries that activity again and again until it has been mastered. Even the pronunciation of the first words takes place by means of operant conditioning. Later on Skinner [7] also elaborated in detail basic principles for the programmed learning of pupils, as well as a more complex conception of the technology of learning and instruction.

The formation of conditional reflexes in people, especially adults, is more difficult than in animals. For example, in the dog simple vegetative conditional reflexes are formed after five to twenty presentations of the conditional

stimulus, while in the adult man it takes from forty to sixty presentations. Learning by means of conditioning is more frequent with children than with adults. Certain somatic reactions requiring conscious control and will (e.g. withdrawal of the hand as the result of an electric shock) are easily acquired by children, but with certain adults they cannot be formed by conditioning at all.

Perceptual-motor learning

Great significance is attributed to this kind of learning nowadays, since it attempts to elucidate how individual motor operations are chained into functional complexes, e.g. in writing, typing, in various sporting disciplines, in playing musical instruments. Therefore this kind of learning is sometimes described as a chaining of motor acts.

With perceptual-motor learning, the motor responses (motor acts) are more complicated than the motor responses formed by conditioning; they are of a different quality as well. With this kind of learning the point is not only the mechanical linking or chaining of individual motor elements, but the integrated functional and dynamic unity of all components.

Verbal learning

The most fundamental characteristic of verbal learning is the formation of inter-verbal associative connections. This means the formation of associations between individual words, not on the basis of any causal connection or comprehension of their meaning, but just on the basis of contiguity, when the words come into spatial contact, either simultaneously (simultaneous contiguity) or in an immediate temporal succession (successive contiguity).

The power of the associative connection between the verbal elements depends, in substance, on two conditions. They are the law of frequency and the law of recency.

The law of frequency acknowledges the fact that the more often certain verbal elements appear next to each other or after one another, the stronger are the associations between them. The more often certain words are contiguous in space or in time, the more stable are the connections formed between them (the law of contiguity in space and time).

The law of recency expresses the fact that the more recent is the contiguity between the verbal elements, i.e. the more recently they have been used together, the firmer is the association between them.

These two laws of association are of great importance both in verbal learning itself as well as in reproducing what has been learned.

The laws of verbal learning were researched by means of learning experiments with meaningless syllables or meaningful words or numerals that had no logical links between them. The point was to eliminate as far as possible the influence of previous learning experience. This kind of experiment was introduced by the German psychologist H. Ebbinghaus (1850-1909) and it is noted for two characteristics:

1. Ebbinghaus conducted all the learning experiments on himself (he himself learned the tasks, measured the level of his learning, evaluated and analysed his performance).
2. To investigate learning, Ebbinghaus used nonsensical syllables or a series of them (e.g. he used the following list of — to him — ten nonsensical syllables: cev, big, fer, lat, lon, lek, me, buv, te, leg).

Of great importance in verbal learning is memorizing. As a measure of memory performance Ebbinghaus used the number of syllables reproduced after a certain period (after the first presentation) and the number of repetitions required before the syllables were learned in full. He stated three basic methods of verbal learning:

1. The method of retained elements identifies the number of verbal elements (words, numeral, syllables) reproduced by subjects immediately after one presentation.
2. The method of learning is often characterized as a method of acquisition. With this method the subject learns the presented material until it can be reproduced faultlessly: the subject is presented with a series of fifteen words; after each repetition the subject tries to reproduce the series; according to the level of acquisition of learning elements, the so-called curves of learning are made to represent the sequence graphically.
3. The saving method consisted of learning a series of syllables until they were fully acquired. After some time (hours, days, weeks), the material was repeated again, although already by the following day some elements of it had been forgotten. Therefore it was necessary to learn the sequence of syllables over again. A record was kept of how many repetitions were necessary with every new learning process. The results showed that the once-learned-but-forgotten elements were more effectively learned than new material. This is explained by the so-called 'sub-threshold cues', i.e. implantation, which is not sufficient for faultness reproduction, but helps faster acquisition of the forgotten material.

Verbal learning is influenced by several factors, namely: (a) the extent of the learning material; (b) its character; (c) its complexity; (d) the discrimination of elements; (e) the position of elements.

The extent of the verbal learning material means the number of learning elements the individual has to learn verbally. The point is to what degree

learning depends on the extent of the verbal material. If, for example, the subject learns a complete five-word sequence after one presentation, this is a 100 per cent performance. If from ten words presented seven are learned immediately (which is more in absolute terms than in the first case), this is only a 70 per cent performance. If there are forty-nine words and only seventeen of them are learned after one presentation, this is a 35 per cent performance. On this basis Ebbinghaus formulated the law according to which the number of repetitions does not grow proportionally to the quantity of the material, but much faster. While six or seven nonsensical syllables could be faultlessly repeated after one presentation, twelve syllables required sixteen repetitions, while twenty-four syllables took as much as forty-four attempts.

The productivity of verbal learning decreases as the number of learning elements increases, and this decrease is disproportional. If a pupil needs fifteen minutes to learn a ten-line poem, it may take sixty minutes, i.e. four times longer, to learn a twenty-line poem.

The effect of verbal learning is also influenced by *the character of the learning material*. Research into this sphere has shown that learning fifteen meaningless words required 20.4 repetitions; fifteen meaningful words (but without any logical relation), 8.1 repetitions; and fifteen words forming a logical sentence, 3.5 repetitions.

The complexity of the learning material also influences the process and outcome of verbal learning. The learning elements may be characterized as easier or more difficult, as simpler or more complex. With the so-called easier materials, the progress and the pace of learning are at first faster, but later on they slow down. For example, learning a foreign language may at first seem to be an easy task, but later on it is realized that it is far from being so easy.

Discrimination of elements in the learning material also has a role to play in verbal learning. The better the individual elements of the learning material can be distinguished, the sooner they are learned. This is especially true with younger pupils.

The process and outcomes of verbal learning are further influenced by *the position of the elements in the learning material*. For example, pupils will quickly learn the beginning and end of a lengthy text and make most mistakes in the middle. This phenomenon is explained by proactive and retroactive inhibition. The middle is influenced both by the preceding as well as by the following elements in the material. The beginning does not undergo the

influence of the proactive inhibition and the end does not undergo the influence of the retroactive inhibition.

As far as verbal learning and its significance are concerned, especially in the school, opinions are frequently expressed condemning this kind of learning, considering it as mere memorizing or verbalizing, i.e. learning without comprehension of the learned material. This criticism is justified when schools emphasize this kind of learning at the expense of other forms. On the other hand, it is necessary to mention that even this kind of learning has its position in formal education. It is a kind of first step before conceptual learning and learning by problem-solving take over.

Conceptual learning

Conceptual learning is conceived as the acquisition of a common response to stimuli which, though differing, possess some common features. Conceptual learning is already of great importance in primary schools, since it develops the pupils' thinking. In Czechoslovakia, the person who has studied conceptual learning (and the psychology of learning in general) to the greatest degree is Linhart.

Logic investigates concepts without regard to their bearer, i.e. the way the subject perceives them.

Psychology investigates concepts as a component part of man's mental life. In the psychology of learning, concepts appear as extraordinarily mobile, dynamic phenomena, difficult to confine within logical categories. The meanings of concepts in individuals may constantly change, due to the growth of experience and knowledge.

In conceptual learning two processes may be distinguished, namely the formation and the attainment of concepts. However, most frequently they appear together; they mutually complement one another and it is the combination of these two processes that is called 'conceptual learning'.

The most important processes of concept formation are analysis and synthesis. In individual stages of concept formation they are diversely represented.

In the first phases of concept formation by pupils the so-called initial or elementary generalization appears. The process of analysis is still missing. For example, when the relation between the word 'butterfly' and the concepts of 'insect' and 'bird' was investigated, children generally considered the butterfly to be more a bird than an insect.

After the initial generalization, with the dominance of the process of synthesis, differentiation follows, i.e. discrimination of individual characteristics

and properties of objects and phenomena. In comparison with the preceding stage, the process of analysis dominates. But even this learning can be incomplete and often even incorrect, since in picking out individual elements of the learning material the pupil still does not understand their coherence.

An important position in concept formation is the process of abstraction, characterized in psychology as an intellectual act, process or operation during which the insignificant characteristics and properties are dismissed and the substantial, typical signs and properties come to the fore. As a rule, the process of abstraction appears together with the process of generalization, which makes it possible to unify the objects in thought on the basis of abstracted common signs.

Vygotskij (1896-1934) [8] distinguishes three stages in the development of concept formation in children:

1. Sorting out a shapeless, disorganized heap of objects, designated by a word, often without any internal relation between them;
2. Formation of complexes, groups and families of objects on the basis of their objective, common features and immediate image;
3. Formation of true, fully developed concepts.

An indispensable role in concept formation is played by the word, the language. The word represents a means of uniting the psychic experience into a concept.

With concept attainment the situation is different from that of concept formation. The process of concept attainment in the guided learning of pupils means that the pupils purposefully acquire the concepts used by adults, formed in the long process of social development. In this way the results of human cognition and activity are transmitted to pupils. Therefore it is said that conceptual learning has two aspects. One aspect represents the concept formation by the subjects themselves (with the adults' help), while the other is composed of the attainment of ready-made concepts formed by society. The concepts acquired by purposeful, systematic learning and study are called scientific concepts and the ones formed by the child himself are called experiential (elemental) concepts.

In guided learning the teacher may facilitate the pupils' conceptual learning in several ways. Travers [9] suggests the following steps:

1. Reducing the number of irrelevant attributes;
2. Improving the identification of relevant attributes;
3. Providing pupils with sufficient time for verifying their performance in the process of concept attainment, through feedback information;
4. Facilitating the pupil's system of coding information;
5. Facilitating the arrangement of concepts into an order corresponding to their structure; the point is the structuring of concepts by the pupils themselves (inferiority, superiority, co-ordination, identity).

Problem solving

Problem solving is considered to be a kind of learning, since success in solving a problem leads to a change, a modification of the learner's behaviour.

Most questions concerned with this kind of learning involve the classification of problems into fixed and open-ended solutions, i.e. those with many different solutions. With fixed solutions the thought processes must converge into a single solution. Convergent thinking is applied. On the contrary, open-ended problems require divergent thinking on the part of the problem solver.

What is the role of analysis and synthesis in problem solving? Rubinštejn [10] emphasizes that in problem solving, as well as in the thought processes of the subject, the preferential position is taken by analysis. By means of analysis, the given, known facts of the problem are distinguished from the unknown, 'sought for' ones. Such analysis pinpoints the circumstances of the task as well as its requirements.

Correct analysis does not represent the mechanical division of the whole into its constituent parts. Dividing or sorting out the parts of the whole is accompanied by the thought process of combining them with new elements, so that new properties of individual parts are continuously disclosed.

This means that the process of analysis is followed by that of synthesis. In synthesis the conditions and requirements of the problem are mutually compared. This is the confrontation of the given problem with those tasks that the subject has already resolved — experience to be drawn on in order to solve new problems.

The results of experiments, educational knowledge and daily practice point out that the ability to solve problems is dependent on experience. Experience with a particular group of problems is generally considered to be the basic prerequisite for solving problems belonging to that group.

Previous experience with solving certain problems, and their repetition, form a certain disposition or basis for solving similar problems and tasks. This disposition then 'forces' the learner to use the acquired model for solving similar tasks. The disposition represents a temporary or a permanent readiness to adopt a certain approach or a combination of approaches for a certain problem or task. However, these approaches may also have a negative aspect, especially when pupils have been taught to utilize ready-made formulas, which may subsequently hinder the development of their independent, creative thinking.

In connection with the development of learning by problem solving, educators attribute great significance to problem instruction. Problem instruction may be considered to be the highest form of guided learning. The substance of problem instruction lies first of all in the activity of the pupil (helped by the

teacher) in searching for and finding ways of solving the given problems both in the classroom and during homework.

The issue of learning by problem solving was first proposed at the beginning of this century by the American scientist J. Dewey (1859-1952), but he based his approach on pedocentric tendencies and thus underestimated the teacher's role. He was interested not so much in guided learning, but rather in the spontaneous learning of pupils.

The great propagator of problem instruction in the United States is J.S. Bruner [11] who wants pupils in schools to imitate the approach of scientists and artists. Though he takes into account the child's personality development, what is of greatest importance to him is the 'structure' of the knowledge. His 'optimum structure' of knowledge represents a complex of learning elements, from which the pupils may acquire a more extensive quantity of knowledge. This complex should, according to him, be compiled by the most outstanding scientists.

Problem instruction is considered to be the most suitable form and the most suitable method of developing pupils' creative thinking. By means of this kind of learning the teachers try to eliminate uniform, dry, rote learning by pupils.

PSYCHOLOGICAL LEARNING THEORIES

On the basis of the chronology of their origin, as well as for the purpose of our presentation, the following learning theories may be discussed: older learning theories; theories following from cognitive concepts; theories based on classical conditioning; and theories based on instrumental conditioning.

Older learning theories (associationism)

The associationist theory is considered to be the oldest psychological theory of learning. Its most prominent representative in the field of human learning was J.F. Herbart (1776-1841), who conceived psychology as the science of images. Psychology then studied the way in which images arise, the way they are associated and the way they disappear. Thus, the process of remembering images appears above the consciousness threshold and, in the process of forgetting, the stronger images push the weaker ones below the consciousness threshold. According to him, learning represents the constant incorporation of new images into the stock of old ones. It is a biased intellectualist conception of learning; it fails to appraise sufficiently the activity of the pupil.

The experimental methods of research into associations and memory were elaborated by H. Ebbinghaus.

The associationist theory was subjected to criticism and was blamed for the following shortcomings:

1. Associationists reduced the learning processes to memory processes.
2. The associationist theory did not respect and sufficiently elucidate the learner's motivational factors in learning.
3. The problems of developmental aspects of learning were insufficiently described.
4. The model of associating images and sensations did not solve the problem of the origin of concepts and thought operations, since the relation between learning and thinking was not solved.

Theories of learning following from cognitive concepts

Before approaching the analysis of those learning theories resulting from cognitive concepts, we shall introduce some notes on individual general psychological principles.

The cognitive concept in psychology is of vintage date. It was newly revived in the 1970s, when it occupied almost all the basic research in North American psychology. However, no new principles of psychological system formation were formulated (Kováč) [12]. Nowadays there is concentration once again on cognitive processes.

Even humanistic psychology, which as a psychological movement claimed a general theory, was stifled by its own inner contraditions.

In socialist countries two basic principles are accepted in general psychology, namely the principle of activity and the principle of contact.

From among the learning theories following from older cognitive conceptions we shall introduce the theory of learning by insight and the Tolman's $S-O-R$ theory of learning.

The theory of learning by insight

From the very beginning of its existence, the theory of learning by insight rejected the atomistic-elemental approach of the interpretation of the psyche in general and the interpretation of learning processes in particular. This theory of learning follows from the psychological trend of Gestalt psychology, laying stress on the decisive role of the whole structure and its superiority over the parts. According to Gestalt psychology, problem solving and the process of cognition, i.e. learning, proceeds in such a way that the learner simultaneously comprises into the field of perception all the parts (elements) of the problem situation and conceives their function in a new structural (pattern) according to new relations. The process of structural transformation is taking place, namely a shift in the dominance and subdominance of elements in the form of

so-called 're-centering'. In problem solving it is mainly the missing elements and relations that are supplemented, leading to a new structure, a new pattern. Based on these positions is the fact that the Gestalt psychologists do not take into account the role of previous experience in learning. In so far as previous experience has no insight tendency, they do not consider it as a decisive factor. Learning by insight is considered by them as an act of a sudden (flash) solution, accompanied by the relaxing of tension. According to classical representatives of Gestalt psychology (Wertheimer, Kohler, Koffka) learning is conceived as a change in the organization of psychic contents. They explain this change by the fact that, on the basis of new elements entering the field of perception, the structure of the entire psychic field is modified. This process is controlled by special conditions of a global pattern, its source being like an inborn ability to suddenly comprehend substantial relations in a problem situation.

In many European countries learning by insight started to penetrate into teaching. The synthesizing method, based on associationist theories of learning, started to be criticized. Especially when teaching reading in the first grades of primary school was being discussed, it was often stressed that children should learn to read by the global method, i.e. the method of complete words and sentence complexes.

From the point of view of its era, the following positive features of the theory of learning by insight may be distinguished:

. Gestalt psychologists distinguished human learning from animal learning. They perceive human learning to be controlled by specific laws.
2. They suggest a certain procedure in learning by problem solving.
3. When the problem or the task is presented in such a way that the pupil can comprehend the individual elements, he/she is given the chance not only of reproducing the material exactly, but also of applying the knowledge thus acquired in practice.
4. If the pupil understands the individual elements of the subject matter and their relations, a strong transfer effect from one problem situation to any similar ones arises.
5. In the educational sciences, the Gestalt psychologists stress the inevitability of a natural procedure in education and upbringing. Their views coincide with the views and experiences of prominent educational theoreticians and practicians in the history of education (Pestalozzi, Komenský, Rousseau, Tolstoj and others).

The basic Gestalt psychological theses contain both correct and incorrect, even biased, theoretical starting-points for learning by insight.

From the psychological point of view the most serious objection to the theory of learning by insight points to the fact that Gestalt psychologists refuse the role of analytical activity in synthetic integration of the elements in resolving tasks.

Tolman's S—O—R theory of learning. Tolman's theory of learning may be found in literature under different names. Once it was called the 'molar' theory of learning, at other times the 'Gestalt-behaviourist' theory of learning, the 'cognitive' theory of learning, or the 'orientation' (target) theory of learning.

Tolman, in accordance with other neo-behaviourists, based his learning theory on the *S—O—R* scheme. Classical behaviourists used the scheme *S—R* (stimulus-response). Tolman inferred that animal behaviour cannot be explained in such a simplified way. Therefore he introduced into the scheme the central *O* symbolizing the complex of mediating processes and states, designated as 'intervening variables'. Intervening variables represent phenomena that cannot be directly observed (nervous activity, previous experience, various states of the organism). So that, besides independent variables (conditions affecting the subject during the experiment) and dependent variables (responses observed under given conditions), the intervening variables were also introduced. Tolman considered intervening variables only as logical constructions of the scientist, defined in an operationalist way.

Foppa [13] stresses three basic theoretical principles of Tolman's theory of learning:

1. *The function of signs in learning.* Tolman does not connect signs with the meaning of the object, but considers them to be the substitution of one stimulus by another. The sign arises when one stimulus starts to designate another sign. The spatial arrangement and their dependence as to meaning are designated by Tolman as sign-Gestalt. The organism then learns the way towards the objective. The system of knowledge from the surrounding environment was later on called 'cognitive maps' by Tolman.
2. *Expectation of means and aims.* The organism expects that certain forms of operations with certain objects will make it possible to get into contact with other objects. The activation of expectation depends on the learned conditions that best correspond to the present situation. If, on the basis of a specific expectation, the chosen way leads to the desired aim, the expectation and the behaviour of the organism will be reinforced and the signs leading to that aim will gain greater significance. According to Tolman, learning is, indeed, the formation of expectations. In his later works Tolman abandons the concept of 'expectation of a significant Gestalt' that he tried to define in an operationalist way and instead based himself on the concept of a phenomenal field, or field of behaviour that he defines as a 'system of behaviour possibilities'.
3. *Latent learning.* One of Tolman's merits is that he called attention towards the so-called 'latent learning'. He put forward his theory on the basis of his experiments with animals (rats) in labyrinths. Even when the animal was put into a maze without food that would direct its behaviour, it still learned the

plan of the maze. This was demonstrated by the fact that when, later on, food *was* placed in front of the exit from the labyrinth, on the basis of its previous latent learning this animal reached the food sooner than an animal that was put into the maze for the first time.

Cognitive theories were not successful in clarifying the basic mechanisms and laws of learning, but, nevertheless, they were successful in undermining the position of the classical *S-R* theory of learning that had gradually become a handicap in human learning.

Learning theories based on classical conditioning

The theory of I.P. Pavlov. At the time when, in Germany, voices of psychologists were heard raised against Wundt's conception of the psyche, I.P. Pavlov obtained in his notorious experiments the first empirical evidence that psychic activity was dependent on the functional state of the nervous system, especially its centre — the brain, but most of all on the functional state of the cortex of the large cerebral hemispheres.

Pavlov discovered the basic physiological mechanisms of learning, i.e. the formation of conditioned reflexes. His discoveries became explanatory mechanisms for learning and forgetting (external inhibition, kinds of internal inhibitions: conditional inhibition, inhibition by delay, differential inhibition, analytical-synthetical activity of hemispheres, the cortex as a uniform complex dynamic system, differentiation and generalization, concentration, irradiation, mutual induction of basic nervous processes — excitation and inhibition). Pavlov and his school are also of a great importance for clarifying the mechanisms of fatigue (Durič) [14], and two signal systems.

Pavlov's conditioned reflex method of learning is still used in psychological laboratories throughout the world where learning is investigated. It is still fruitful and inspiring for many researchers.

J.B. Watson's theory of learning. Watson is considered to be the founder of behaviourism. This trend originated in the United States at approximately the same time as Pavlov started to publish the results of his work in Russia. The doctrine of Pavlov, as well as the reflexology of Bechterev, greatly influenced Watson.

According to Watson's theory of learning, all individual experience is reduced to the selection and reinforcement of responses contained in the instinctive store of the organism. According to this theory, there are no new connections formed between new stimuli and responses, but, due to inborn connections, every stimulus becomes related to a great number of responses which come into action only in certain situations. This rejection of the possibility of making new connections follows from the rejection of the function

of the cortex of cerebral hemispheres in learning. The choice of responses to a given situation is explained by Watson by means of two laws: the law of frequency and the law of recency. The more frequent is the response to a certain stimulus, the more frequently it will be applied in the future, when the given stimulus appears. According to the law of recency, the more recent is the connection between the stimulus and the response, the more probable it is that the appearance of the stimulus will evoke just that response and no other one.

Watson conceived the conditioned reflexes of Pavlov in a simplified, narrower way. In Pavlov's doctrine he could see just the formation of conditioned reflexes of secretion. By his behaviouristic conception of learning he was unable to explain the way man learns, especially in the initial stages.

The theory of learning by E.R. Guthrie. Guthrie's theory of learning is called the 'contiguous theory'. The substance of the theory is as follows: if the stimulus is connected with one movement, it may evoke a movement reaction. The prerequisite of learning is the formation of a connection on the basis of contiguity in time. According to this theory the connection between the stimulus situation and the response is not dependent on frequency, but, according to the principle 'everything or nothing', it is installed with the first trial, with the first contact (contiguity). It represents learning without mistakes, without the necessity of reinforcement to form the connection between the stimulus and the response. The connecton between *S* and *R* is either formed, or not; there is no in-between situation. In learning, Guthrie acknowledges only the law of recency, i.e. the last response remains learned, without regard to the result.

Guthrie does not acknowledge the mechanisms of extinction, which follows from the fact that he does not acknowledge even exercise or repetition.

Learning theories based on instrumental conditioning

The substance of instrumental (operant) conditioning has been explained in more detail in the section on kinds of learning. The basic differences between this kind of conditioning and the conditioning studied by Pavlov have been pointed out. It has been stated that instrumental conditioning is most of all linked with the name of B.F. Skinner, who had a predecessor in the person of E.L. Thorndike.

E.L. Thorndike's theory of learning (connectionalism). E.L. Thorndike is considered to be the pioneer of zoopsychology and is also called 'the father' of American educational psychology. His learning theory is called 'the theory of

connectionalism' in the expert literature, and the process of learning proceeds according to him by trial and error.

On the basis of the results from his animal experiments, he postulated three so-called 'great laws' and five so-called 'little laws':

1. *The law of readiness* means that, if the operative unit (the structure of the nervous system) is ready to act, then activity will satisfy the organism, while inactivity will bring about discontent. When the operative unit is not ready to act, yet must be active, a similar state of discontent follows. If, for example, the child longs to do something, but is not allowed to, discontent follows. The child is also upset when made to do something it does not want to do. It is content when allowed to do what it wants to. This law concerns motivational factors.
2. *The law of exercise* (frequency, practice, repetition, application) means that the more a certain response is connected with a certain situation, the more the connection between them is reinforced, and vice-versa. Exercise reinforces the connection between *S* and *R*; the absence of exercise makes it weaker. Secondary factors influencing exercise are the intensity and recency of the stimulus. The more recent is the connection, the more easily it is restored.
3. *The law of effect* means that satisfaction with the outcome will reinforce the connection between *S* and *R*, while dissatisfaction (the experience of failure) weakens it. Thorndike considered this law to be the basic law of learning and teaching.

The majority of psychologists have criticized these laws of learning in their original form. A detailed analysis of them shows that they ignore the real operative factors in learning and do not take into account the learning situation.

The law of readiness reflects the reality of the function in learning. This law was not modified, not even by Thorndike himself. The law of exercise, however, is not valid in the original Thorndike version. The author conducted experiments with people. The subjects had to practise drawing lines of a certain length with their eyes bound. The results showed that, without the knowledge of results of earlier attempts, the performance did not improve, even after multiple repetitions.

Neither is the law of effect valid in its original form. If satisfying effects strengthen the connections between *S* and *R* and the unsatisfying weaken them, then we might be expected to remember the satisfying experiences and forget the unsatisfying ones. However, we remember or forget them to the same extent (or almost so). We still remember experiences that were painful or embarrasing. Pavlov's students connected a conditional reflex to the painful stimulation of an animal's skin. Nevertheless, it is certain that the experience of success plays a positive role in learning.

Pavlov evaluated Thorndike's work positively. However, their theories are incompatible. While Pavlov investigated nervous mechanisms of learning, Thorndike concentrated only on the description of the $S-R$ connection.

Thorndike also tried to apply his learning theory to the educational process. The evidence of these attempts led to the publication of *Educational psychology*, in three volumes (published in an abridged version also in Czech) in 1929 [15].

Criticism of Thorndike's learning theory (connectionalism), based on the analysis of the works in American expert literature, concludes that the application of this theory to the educational process in the United States reduced the significance of didactics, especially in teaching mathematics at elementary schools. Drill in learning was preferred, without due comprehension of the subject-matter.

B.F. Skinner's theory of learning. Since the 1950s Skinner's theory has become the most widespread learning theory in educational psychology all over the world. His name has also been connected with the programmed learning movement.

The basic scheme of Skinner's learning theory is stimulus-response-reinforcement, while two kinds of responses may occur: (a) 'respondents', evoked by observable and controllable stimuli; (b) 'operants', responses of the organism to unknown stimuli, which, therefore, can be neither observed nor controlled. The outcome of these responses is so-called operant or instrumental behaviour, arising on the basis of operant or instrumental conditioning.

On the basis of extensive experiments, Skinner came to the conclusion that new elements of behaviour in the form of 'operants' arise depending on the internal needs of the organism, and are reinforced on the basis of success or satisfaction. The main characteristic of operant behaviour is the fact that the responses represent the means of reaching the objective. Operant behaviour is determined and controlled by its consequences, while the organism's behaviour is conditioned by previous experience and is maintained by appropriate reinforcement. Skinner's conception of reinforcement and its task in learning is rather broad. However, he attributes particular significance to the reinforcement of success. Success, according to him, may be of two kinds: primary (e.g. obtaining food) and secondary (e.g. gradual change of behaviour appropriate to the objective). Of greater significance in man is secondary success as a meaningful factor of reinforcement [16].

Skinner's theory of learning greatly influenced educational psychology, especially the psychology of learning and instruction all over the world, and particularly in the form of programmed learning, of which he is considered to be the founder.

In one of his fundamental works, *The technology of teaching* [16], Skinner draws attention to the fact that the concept of guided learning is often replaced by other concepts, by other word images.

1. There are the concepts of growth, maturation and development expressing change in an individual's behaviour. According to these concepts it would then be possible to investigate changes in pupils' behaviour over time. The teacher's activity would be reduced to support of the pupil's growth; guiding and cultivating, similar to the work of a gardener. Skinner points out that the child may be born with the ability to learn English, but no child is born with the knowledge of English, so that in this sense there is no growth or development in the English language.
2. There are several variants to the concept of acquisition of knowledge and experience. According to the *osmotic variant*, the pupil absorbs, 'sucks in' the knowledge of the surrounding world. Instruction then represents a form of 'alchemistic moisturing': the pupil is watered with the love of learning, the concepts are poured into him and the wisdom instilled. In the *gastronomical variant*, the pupil is hungry or thirsty for knowledge; he must digest the facts and ideas (on condition that he is not given more than he can digest). According to the *fertilization variant*, the teacher is the sower of grain. He plants into pupils the seedlings of concepts that take root and sprout, if the soil of the intellect is fertile. The *medical variant* is based on the concept of infection. The teacher infects the pupils with knowledge.
3. According to the concept of construction, the teacher's work represents building in the sense of a bricklayer 'building walls' to a certain height.

According to Skinner all three verbal substitutes of the learning concept are deeply engraved into our expert and non-expert language, and often cannot be avoided. He proposes that the psychologist dealing with the pupil's school learning and the teacher's teaching should investigate three variables forming the foundation of reinforcement. They are: (a) situations in which new behaviour appears; (b) the behaviour itself; and (c) the consequences of behaviour.

According to Skinner learning means simply reinforcing and arranging connections.

The views of C.L. Hull. Clark L. Hull tried to model his learning theory according to the model of physics, especially Newton's system. Hull's system contains three kinds of variables. Two of them are observable:

1. The so-called *input variables* (independent variables) include: (a) stimuli as physically determined quantities; (b) conditions causing an instinctive state (e.g. determined by the time of last presentation of food); (c) number of reinforcements; (d) degree of reinforcement; (e) work necessary for the per-

formance of a given response; (f) the force with which the given response affects other previously learned stimuli.

2. The so-called *output variables* (dependent variables) include: (a) latency of the response (i.e. interval between the response and the stimulus evoking it); (b) amplitude of the response; and (c) frequency of the response.
3. The third category contains intervening variables, connecting the above observable variables, forming, as it were, a bridge between them.

Hull's theory of learning did not contribute any more significant results to the psychology of instruction. His basic starting-point, a theory of learning based on need (instinct) reduction and habit, cannot be sufficient for clarifying and directing an individual's activity in the field of conceptual learning and learning by problem-solving.

The views of N.E. Miller. Miller, a disciple of C.L. Hull, distinguishes four phases or support processes in learning: (a) instinct; b) signal; (c) response; and (d) reinforcement (reward).

Contrary to Hull, Miller conceives instinct as something concrete. Instinct is the factor which forces activity. Every stimulus may become an instinct, if it achieves the required force. The greater the force, the more is the instinctive value of the stimulus increased. However, according to Miller, the stimuli may also attain the significance of a signal. The stimuli triggering an individual's response, aimed at instinct reduction, are called signals. The stimuli may then have the value of an instinct or a signal (the instinct value is determined by the force of the stimulus and the signal value by the distinction of the stimulus from other stimuli — differences in the character of stimuli).

Miller demonstrated the four phases of learning through experiments with hungry rats in a cage:

- The instinct represents the rat's hunger.
- The most important signal represents the lever by means of which the food is pushed nearer or the door to the food is opened.
- The response of the rat consists in pressing the lever.
- Obtaining the food represents the reward (reinforcement).

As can be seen, Miller's theory has a very general character and does not take into account Hull's so-called intervening variables.

The views of K.W. Spence. Spence is considered to be the closest of Hull's collaborators. He modified Hull's original theory by laying greater stress on the role of cognitive processes in learning and limiting the role of reinforcement.

Contrary to Hull's theory, Spence does not consider the power of habit to be dependent on reinforcement, but rather on the time during which the response

was occurring in the presence of stimuli. He emphasizes the principle of contiguity and eliminates the fundamental role of reinforcement.

The views of O.H. Mowrer. Mowrer holds a compromise view on basic conceptions of both kinds of conditioning. According to him the contradiction between Pavlov's physiology of higher nervous activity and Thorndike's (or Hull's) law of effect may be avoided by simultaneously accepting both principles, i.e. classical and instrumental conditioning. Mowrer acknowledges these principles with respect to two learning theses, namely: (a) sign learning; and (b) solution learning.

He considers two kinds of emotional states to be the foundations of this theory: fears and hopes.

According to Mowrer, the first phase of learning is sign learning. In this phase, on the basis of conditioning, the emotional states of fear are formed. Any conditional stimulus (independent variable), simultaneous with the painful stimulus, consequently evokes fear.

The second phase forms the learning solution. The individual discovers a solution to the problem based on finding a way of gradual (or even sudden) elimination of fear.

Mowrer's theory of learning is also called a bi-factorial theory since its author acknowledges two kinds of reinforcement, one ensured by instinct and the other ensured by the reduction of instinct.

The views of W.K. Estes. In the same way as Guthrie, Estes builds his learning theory on the principle of continuity between *S* and *R*. He distributes all the responses to given stimuli (*S*) into two groups, or categories: R^1 and R^2. The first group (R^1) incorporates responses causing states of pressure and tension at a given moment. The second group (R^2) contains all the other responses.

The responses are observable and measurable forms of behaviour in the organism.

The reinforcement between *S* and *R* is considered by Estes as a situation increasing the probability of a certain response.

Estes openly opposed Skinner's gradual progress in learning. He held the view that learning takes place without repetition. This is the so-called 'on-the-spot' learning. He applied the law 'everything or nothing', i.e. learning either takes place immediately, or does not take place at all; if it does not take place immediately, it will never take place. Repetition will not help.

Soviet learning theories

Educational psychology in the USSR is noted for the following concepts of learning. Learning is conceived as:

1. The attainment of concepts (Menčinskaja).
2. Problem-solving (Rubinštejn).
3. The acquisition of algorithms (Landa).
4. Rational operations formation (Gałperin).

Learning as the attainment of concepts (Menčinskaja and Bogojavlenskij) [17]. The group of Soviet educational psychologists centred round N.A. Menčinskaja and D.N. Bogojavlenskij (1959) proposed a theory of learning according to which the directed learning of man takes place through the process of analysis and synthesis. Their theory is based on the results of a practical experiment carried out in a school.

According to Menčinskaja's school-of-thought, in the course of learning, i.e. attainment of concepts, the processes of analysis and synthesis undergo qualitative changes. These changes take place in two forms, namely:

1. The transition from a very gross, global analysis to its differentiated forms, as well as the transition from a unilateral, partial synthesis to a complex, full synthesis.
2. The relation between the levels of analysis and synthesis are changed qualitatively in the process of learning.

Menčinskaja often stressed that learning should not aim so much at the product resulting from the acquisition of a system of knowledge (quantity of knowledge), but first of all at thought processes developed by learning. According to this view, correct organization of learning elements and of the procedure of learning reveals great possibilities for the development of the pupil's independent thinking during all school grades.

According to Menčinskaja one of the rules applied in learning is 'from simple to complex'. Of great importance are the tasks instigating pupils' independent thought activity. This importance lies in the fact that the task to be solved by the pupil determines the state of those thought processes that must be activated to find a correct solution, as well as the degree of the pupil's independence in solving the task.

By altering the tasks we can regulate the processes of thought activities.

Learning as problem-solving (according to Rubinštejn) [18]. S.L. Rubinštejn and his school perceive the substance of the learning process in 'problem-solving'.

The foundations of the learning process are formed by the thought operations of analysis and synthesis, which are constantly exchanging their positions. It is in substance (as Rubinštejn liked to describe it) 'analysis through synthesis'.

Rubinštejn distinguished two kinds of analysis in problem solving:

1. Initial analysis, a kind of 'filter' gradually filtering or sifting the unsuccessful solutions (the point is the initial irradiation, when in the first stage of problem solving the thought analysis concentrates on the whole broad field affecting the task to be solved).
2. Tendentious analysis, aimed at disclosing the most substantial content, properties and relations.

As stressed by Rubinštejn, analysis is followed by the process of synthesis. This process represents the mutual comparison of conditions and requirements of the task. When man cannot solve the task, he refers to the act of synthesis and starts to confront the present task with previously resolved tasks. He starts to make use of the way previous tasks were solved in order to find a solution for the present one. This is how the processes of analysis and synthesis are conceived.

The basic theoretical works of S.L. Rubinštejn in the field of learning (as problem solving) have been the subject of detailed practical research by Soviet educational psychologists, using pupils and control learning materials. Learning in school is arranged in such a way that it has the character of problem-solving situations.

The problem situation the pupil is faced with contains three main components:

1. The unknown relationship, way or complex of conditions of the activity leading to its solution. These unknown factors appear in the problem situation.
2. The operation inevitable for solving the given problem. To reach a successful solution the pupil *must* perform this operation.
3. Individual possibilities of the pupil to analyse the parameters for resolving the given task. In this connection the principle comes into play that a very difficult as well as a very easy task do not evoke problem situations.

The solving of a problem situation forms the main component of problem learning and instruction.

On the subject of learning by problem solving, Soviet educational psychologists consider as their basic task the exact classification of problem situations. As one of the most general foundations of this classification they use the activity of man. On this basis they distinguish three classes of problem situation:

1. Situations in which the structural position of the acquired unknown variable is assumed to be the goal of the operation, i.e. the goal of the solution is unknown.
2. Situations in which the unknown variable represents the operating method.
3. Situations with unknown conditions of operation.

It need not be especially stressed that one of the main advantages of problem solving (as a learning theory) and problem learning lies in the fact that they provoke possibilities for the creative acquisition of the subject-matter and thus lead to optimum conditions for the development of pupils' creative abilities.

Learning as the acquisition of algorithms (according to N.A. Landa) [19]. The strict succession of operations leading to the solution of all tasks in a given group is called an algorithm. Algorithms may be constructed by means of a system of rules, operations or procedures and, when used with a task of a given type, lead to its solution.

Algorithms are used first of all in programming the work of computers and logical machines. As far as humans are concerned, not every task can be solved by means of an algorithm. This means that it is not possible to determine in advance the system of operations that would lead to the solution of every task. In such cases it is necessary to look for other solutions.

Algorithms may be successfully used in teaching mathematics, as well as in the resolution of problems in some other instructional subjects. The problem is, however, that no algorithms have been constructed for these subjects.

At present there is a discussion in the USSR on learning as acquisition of algorithms. It has been shown that not every learning procedure in man can be reduced to an algorithm.

Learning as rational operations formation (according to P.J. Gałperin) [20]. The learning theory of Gałperin (1902-1988) is at present considered to be the most advanced in the USSR. Before reaching its present form, it had gone through three stages of development:

1. Elaboration of a theoretical concept concerning the genesis of activity, as the way from individual to general activity, from extensive to concentrated activity, and from objective to rational activity. These changes gradually succeed one another according to certain rules and in a certain sequence. It took about ten years for Gałperin and his colleagues to arrive at this concept. His colleagues from Moscow University included N.F. Talyzina, D.B. Elkonin, V.V. Davydov, N.S. Pontina, V.V. Repkin and N.J. Nepomňaščaja amongst others.
2. This was followed by the stage of controversy and debate, since a number of experts in Soviet educational psychology were opposed to this concept. The debate had a mainly theoretical significance.
3. Experimental schools were then set up in the USSR and Gałperin's fellow-workers left their psychological laboratories to carry out their research work in the classrooms.

The substance of learning lies in the fact that all the intellectual wealth accumulated by mankind in the form of a system of scientific concepts, rules and methods of thinking may be acquired by pupils only through their own activity. Without the learner's own participation in activity leading to the 'world of objects' successful learning is impossible.

According to Gałperin's theory, learning depends upon two conditions:

1. The character of the operations conducted by pupils; are they aimed precisely at those aspects which are to be acquired?
2. The quality of the direction of these operations.

The microsystem of the direction of human learning has three parts: (a) the directing organ (the orienting part); (b) the operative organ (the performing part); and (c) the verifying and comparative mechanism (the control part of the activity).

The formation of rational operations (acts) in the learner has the following stages:

1. The motivational stage represents the motive to learn. Motivation is inevitable for all human activity, learning included. (Motivation will be dealt with in depth in the following section on the laws of learning.)
2. The orienting justification of the activity. In activity formation this stage has a key role to play, since its specificity is determined by the speed of the process and the quality of the activity. The characteristics of this stage include: the way and the degree of understanding and the level of acquisition. There are two other characteristics: (a) the degree to which the survey of conditions vital for successful activity was complete — this may be expressed as incomplete, complete and superfluous; (b) the way in which the pupil gains the survey of the conditions vital for successful activity — either the pupil is given the survey in a ready-made form (e.g. by the teacher) or he/she gains it independently. Independent gaining of the survey vital for successful activity may take place: (a) by trial and error, directly through the activity; or (b) by conscious application of the generally valid procedure of constructing the orienting foundation.
3. The third stage is that of material or materialized activity. Material activity means the hands-on manipulation of actual objects (replacing them, dismantling them, putting them together, grouping, measuring, sorting). The pupils perform some of these operations in the form of external activity. Materialized activity is similar with the difference that there is no actual handling of objects, but more contact with representations, signs or pictures of these objects (maps, drawings, plans, models, diagrams, i.e. the so-called artificial teaching aids).
4. The fourth stage of learning represents the transition from material (materialized) activity to external, audible speech. In this stage all objects and images of them, as well as all practical activities, are removed, while pupils

respond only orally or in the form of writing. At this stage learning advances to further generalization and abbreviation, but is not yet an automated activity. The pupil is able to speak about the manipulation of objects of or their symbols, but in their absence. It is only in the subsequent stages five and six that interiorization proper occurs.

5. The fifth stage is that of external speech for oneself with the audible element of speech being suppressed. In the preceding process the motor activities accompanied by a multitude of sensoric procedures were gradually phased out, together with the senses of touch, sight and sound, now leaving only concealed articulation. This is the stage where one can be considered as talking to oneself and the activity is changed according to the index of generalization and abbreviation. This is the stage of talking to oneself.
6. The sixth and final stage of learning represents interiorization. This is the stage of rational activity. The learner's activity now takes the form of internal speech, which means that the activity is abbreviated and automated to a maximum extent. All activity takes place in the mind; it is a rational, intellectual activity. Speech disappears from the field of consciousness and what is left is just the objective content, the thought of something.

This then is the process of interiorization, of forming rational mental operations, the process of learning.

To close this discussion on Gałperin's theory of learning it is necessary to mention that this theory is not only valid and significant for learning theory, but has formed the theoretical basis for solving many practical problems of human learning, especially in school.

Last but not least, it is possible to say that, in the course of its development, Gałperin's learning theory has demonstrated its vitality. Experiments have shown that the consistent application of this theory in practice has raised the ability of pupils to learn. Nowadays it may be seen that the representatives of the theory of rational operations' formation have developed an original model of guided learning. Gałperin's concept is still being worked upon. The possibilities of a further (seventh) stage are being investigated, namely the stage of exteriorization of internalized knowledge in the form of its practical application.

THE LAWS OF LEARNING

In this part of our monograph we shall concentrate only on four laws which are mainly concerned with the guidance of human learning, namely: (a) the law of motivation; (b) the law of feedback; (c) the law of transfer; (d) the law of repetition.

The law of motivation

Many authors suggest that, together with the ability to learn, motivation is the essence of learning.

Motivation of learning is ensured by the stimulus following from man's needs. The stimulus based on the need to do something to satisfy a need is called motivation. Motives are in substance internal incentives to certain kinds of activity. Smirnov [21] and his fellow-workers defined motives as follows: 'What is reflected in man's mind and stimulates him to activity, directing his activity towards the satisfaction of a certain need, is called the motive of the activity.'

Motives as internal incentives arise on the basis of internal needs, stimulating the organism towards their satisfaction and, on the basis of stimuli, directing the intellect towards activity of a certain kind. Stimuli with motivational outcomes are called 'incentives'. They are also called 'external motivational factors'.

Motivation may be internal and external.

Internal motivation is considered to be a state 'forcing' the individual to do something or to learn something for personal satisfaction, to broaden personal experience. The human being internally motivated to learn does so willingly, since the learning itself provides pleasure and satisfaction.

External motivation in learning is conceived as a state when the individual does not learn of his own accord, but under the influence of external motivational factors. In formal school learning the pupils often learn under the influence of external motivation.

External motivation of learning has less value than internal motivation. External motivation (incentive) may create a situation where the subject-matter to be learned is very unpopular, leading to a frustrating barrier on the way to fulfilling the set requirements. In this case, i.e. in overcoming the frustration barrier, the pupil's experience of pleasure may not follow from the very process of learning, but from the attained goal which had been set from the outside. When dealing with this kind of motivation it often happens that the 'clever' pupil soon learns to avoid the learning process and tries to achieve the established outcome by cheating, copying and other unwelcome forms of behaviour.

In spite of the higher value attributed to internal motivation, even external motivation has its place in guided learning.

Internalization of external motivation requires that certain conditions should be met. We shall mention them briefly below.

1. *Development level of the pupils.* Motivation for learning and the learner's level of development must be in accord. If the task is beyond the learner's abilities, or if the goal is too distant, external motivation will not function.

2. *Previous experience.* Learning is a process particularly influenced by previous experience. If no account is taken of previous experience and knowledge acquired in the given subject of instruction, it is impossible to motivate the pupil for further learning.
3. *Self-expression.* If no heed is payed to the learner's individuality, endeavour and the desire to express personality in a given direction, it is not possible to motivate for learning. In such a case the opposite effect may be set in motion, either in the form of resignation or aggression.
4. *Aspiration level.* Closely connected with self-expression is the learner's level of aspiration, represented by expectations in the field of success. The appropriate level of aspiration forms the most favourable ground for learning. Very high and very low levels of aspiration in relation to the pupil's potential may unfavourably influence the course of learning.
5. *Interests.* Familiarity with pupils' interests provides an important initial basis and means for learning motivation. When the teacher identifies and utilizes these spheres of interest and associates them with further learning elements, learning becomes more effective. The teachers' own experience will soon confirm that pupils are more motivated to learn the subjects they are interested in.
6. *Knowledge of performance in learning.* If pupils have information about the levels they have achieved at different stages of learning, this knowledge becomes a strong motivating factor for the subsequent stages.
7. *Setting goals.* The setting of exact and clear intermediate goals in learning, and trying to achieve or even surpass them, becomes a strong motivation for pupils. Younger pupils should be set nearer goals, older pupils more distant ones.
8. *Completing the task.* This motivation was investigated in detail in the laboratory of Kurt Lewin. According to Lewin's conception, introduced by Woodsworth and Schlosberg [22], when beginning a new task with an established goal, the so-called 'tension system' arises within the mind, aimed at the achievement of that goal. As soon as the goal is reached, the tension is relaxed (discharged). However, if activity in the achievement of a goal is interrupted, a state of tension remains and the pupil feels forced (as soon as the opportunity arises) to return to that activity and attain the goal. Completed tasks are more quickly forgotten than incomplete ones, due to the relaxation of tension (Zeigernikova's effect).
9. *Reward and punishment.* Reward is considered to be a positive and punishment a negative motivation. They do not work in the same way in motivating pupils to learn. Psychological research and educational practice both confirm that positive motivation is more effective than negative motivation. Nevertheless, even punishment has its role in motivation. Punishment as a motivational factor may be described as follows:

- It is based on fear and this fear may become associated with all learning, not only with that element for which the pupil was punished.
- Because of the unpleasant emotional associations, punishment may evoke irrational and escapist behaviour.
- When the pupil gets used to the punishment and no longer fears it, the motivational effect is lost.
- It causes permanent states of anxiety, which, besides their disorganizing effect on learning, may give rise to neurosis and even more serious health problems.
- It gives rise to unpleasant feelings which reduce commitment and become associated with mistakes.
- It may lead to a loss of confidence in the teacher.
- It is difficult to determine exactly how strict or lenient punishments should be.

However, punishment even has some advantages in learning motivation:

- It may serve as a deterrent.
- It may serve as a means of inculcating discipline in learning.
- It may be very effective when it appears as the natural consequence of an undesirable act and when used in combination with reward.

Contrary to punishment, reward aims at favourably influencing the pupil's future learning activity and acknowledges the pupil's achievements in learning. Reward and punishment can be applied in many different ways and to varying degrees, and they may range from a mild nod of approval by the teacher up to expulsion from school.

As opposed to punishment, the advantages of rewards in learning motivation may be summed up as follows:

- They evoke pleasant emotional states, which are strong incentives to further learning.
- They are ideo-motivating by means of suggestion.
- Their pleasant sensations create interest and enthusiasm in further learning.
- They influence the pupil's self-expression, contribute to a higher, but appropriate, level of aspiration and thus to a higher learning morale.
- Pupils readily seek rewards.

However, rewards do have their negative effects in learning since they may motivate the pupil towards winning a certain compensation rather than an interest in learning itself, and they may also provoke the temptation to cheat.

10. *Success/failure.* This motive is in force throughout our lives. Every human undertaking, especially in its initial stages, is noted for its success or its failure. Success in learning motivates pupils to experience the same feeling again and so they try harder. Pupils should be made to understand that they

cannot always attain easy success or earn a cheap victory. On the other hand, when the failure is too severe, or becomes repetitious, the learner gets discouraged, loses confidence and, with it, the overall motivation to learn. Pupils should be guided in such a way that they experience more often the feeling of success than that of failure, in order that they do not lose the overall prospect of advance.

The law of feedback

The law of feedback is closely connected with the law of motivation. This law was postulated by Thorndike in the form of a law of consequence.

The physiological foundation of feedback in learning was postulated and investigated by the Soviet physiologist P.K. Anohin [23].

It is typical of the learning of man that feedback information is gained about performance either by the learner, or by means of external systems, such as the teacher, the experimenter, a machine or a programme. These two channels of feedback often overlap and mutually complement one another in practice.

N.F. Talyzinâ [24] emphasizes that in guided learning feedback should be the bearer of information on whether: (a) the pupil performs the set activity; (b) the pupil is proceeding correctly; (c) the actual procedure corresponds to the established procedure (especially with younger pupils); (d) the individual's learning activity is properly understood, summed up and acquired.

Great stress is laid on control over individual steps of the learning procedure, making it possible for both the teacher and the pupil to gain information on appropriateness, correctness and speed of activity, as well as on the method of procedure. This feedback information enables certain corrections to be introduced during the course of learning and not only at the 'end'.

The law of transfer

The concept of transfer is used in psychological literature to designate that process the substance of which lies in the fact that the previously learned knowledge and skills influence the learning of subsequent forms of behaviour. The transfer works in the following way: if a pupil has learned task A and then starts learning task B, the learning of task A accelerates the learning of task B. In this case we are referring to the positive effect of transfer. However, there are cases when the learning of task A interferes with learning task B. In such a case we talk of the negative effect of transfer, or interference.

In the field of learning we can distinguish between the so-called 'specific' and 'non-specific' transfers.

Specific transfer utilizes the results of previous learning for future learning of a similar nature. Identical elements in both learning materials are stressed.

Non-specific transfer differs from the specific one by transferring the capabilities (knowledge and habits) from one (seemingly not related) situation to another. Non-specific transfer (called also general transfer) is of great importance in the life of human beings and their development, but especially for education. However, its greatest significance is connected with learning, since it concerns such general factors of learning as methods, ways of problem solving, techniques of learning or emotional adjustment.

Several theories of transfer have been proposed.

One of the first was the theory of identical elements, put forward by Thorndike. This theory stressed the necessity of learning materials to have identical elements if they are to have a positive influence on one another. However, experimental results have not unambiguously proved the validity of this theory.

Another transfer theory was the theory of generalization: transfer from one situation to another takes place to the degree that the learner is able to understand his previous experience. This theory strictly opposes the mechanistic concept of identical elements.

One of the most serious theories of transfer was the theory of relations. The authors were the Gestalt psychologists, who also stood against the theory of identical elements. They alleged that the comprehension of the situation in all its aspects forms the essential basis of transfer in learning.

Modern authors mostly approach the theory of understanding according to Rubinštejn's conception, in which not only the elements of the learning material content may be grasped, but the procedures, ways of learning, organization of learning, attitudes to learning, control, etc., as well. At the same time, it is acknowledged that the higher the kind of learning (conceptual learning, problem solving), the higher the potentiality of transfer.

From the point of view of educational psychology the most important problem of transfer is the question of how to learn. Many experiments have pointed out the validity of the positive effect of transfer as an efficient method of learning, especially in the purposeful development of creative thinking among pupils.

It is generally acknowledged that the effect of transfer in learners is higher when the teacher leads the pupils towards it and when they themselves become active in this sense. For example, the pupils' positive attitudes to learning and their purposeful orientation may bring about the positive effect of transfer.

A special kind of transfer is represented by the so-called bilateral transfer of motor skills. This means the transfer of a habit from one executive part of the body to another. By means of the rule of horizontal and vertical axis it has been shown that the transfer from one limb to another is greatest in the case of symmetrical organs (e.g. from the right hand to the left hand). Significant transfer also occurs when limbs on the same side of the body are concerned

(e.g. from the right hand to the right leg). The least effect of transfer has been shown in the case of organs located diagonally in the body.

The negative effect of transfer, or interference, occurs quite often even in ordinary life. For example, if we have been wearing a watch on our left wrist and then change it to the right one, we keep looking at the left wrist to see what time it is.

Interference may occur in conceptual learning and problem-solving, when principles of solution are transferred to spheres where they are not valid. An example is represented by the application of a rule or principle of orthography in a situation to which it does not refer.

The law of repetition

This law used to be called the law of exercise or frequency.

There are various views on the function of repetition in learning. For example the representatives of associationism and older behaviourists, who acknowledged only the memory function in learning, overestimated the role of repetition.

Lewin strongly opposed the law of repetition. He stressed that the decisive condition of association formation is not repetition, but the readiness to act.

Even the main representatives of Gestalt psychology opposed repetition in learning. They pointed out the negative effect of multiple repetition leading to satiation or over-satiation. This state really does occur, but only when the repetition has become mechanical, without the learner's active participation in the learning material.

A.A. Smirnov [25] truthfully describes the problem of repetition in learning. His approach is based on his own conception of memory, stressing the activeness and logical quality of remembering. The effect of repetition is dependent on the concrete activity of learning during repetition.

Repetition in learning is an inevitable, but not the only, condition. Without the three above-mentioned qualities (motivation, consequence, transfer) repetition could not be effective.

To close the debate on repetition, it should be stated that there is no learning without repetition. Repetition should represent an active process and not mechanical swotting. Repetition must not present a schematic, stereotyped reproduction of operations, but a deep modification of previous acts and an active reformation of the original activity.

LEARNING FACTORS

In formal education (of primary and secondary school pupils) the most important factors in learning are considered to be those that are connected with the learner, the teacher, the learning material and the process of learning itself.

Learning factors connected with the learner

It is generally known that the same subject-matter is learned by one pupil faster than another, while one can remember it better or reproduce it more correctly than another, etc. Research has confirmed these assertions.

The most essential factors for learning connected with the learner are considered to be as follows:

1. *Growth* — learning certain material cannot be started before the mechanisms of learning have become sufficently mature. (In this connection we can mention the so-called 'school maturity' examination).
2. *Previous experience* — every acquisition of new knowledge, skills, habits and personality traits must take into account previous experience, and make use of the preceding level in the given sphere
3. *Abilities* — learners differ in their general and special abilities and this influences the effect of learning in certain spheres.

Learning factors connected with the teacher

In guided learning the teacher represents the central and irreplaceable figure, a key factor. This position follows from the bi-polarity of educational activity, but especially from the tasks and objectives set by society in the field of education. In guiding the pupils' learning, the teacher invests all his/her past experience, needs, desires, knowledge, experience, world-outlook, educational abilities and competence. According to the level of these qualities the teacher may, in one way or other, make the pupils learn more efficiently.

The psychology of learning provides teachers with certain stimuli, making it possible to guide the pupils' learning more efficiently. The teacher's personality will be dealt with in greater detail in the chapter on creativity.

Learning factors connected with the learning material

These factors determine how the kind and extent of the learning material influence the outcomes of learning.

In the section on verbal learning we have already introduced the idea that the outcome of learning verbal material depends on the extent and complexity of that material, and the discrimination and position of elements within it.

Therefore, we are not going to deal with these factors now and we shall mention only those affecting learning as a whole. They are as follows:

1. *The influence of the meaningfulness* of the learning material on the outcome of learning. It is generally known that understanding the meaning and sense of material accelerates learning, when compared with meaningless, insignificant material.
2. *Frequency of the learning material.* This factor is related to meaningfulness and often even considered as the basis for the influence of meaningfulness. Frequency reflects the rate of occurrence of the given material in the learner's experience. Those learning elements the learner has already encountered are more easily and more quickly learned than new, unknown elements.
3. *The similarity of the material* also influences learning, but this influence is often negative because of the difficulties of discrimination. The negative influence of similarity may be overcome or at least reduced by the overall arrangement of individual elements in the learning material. If the learning material is correctly arranged, the pupils comprehend its structure, observe its internal relations, and thereby are more able to distinguish it from similar elements.

Learning factors connected with the process of learning itself

These factors include: (a) individual and group learning; (b) a suitable milieu for learning.

1. *Individual and group learning.* Much research in this field has confirmed that, under certain circumstances, group learning contributes more to resolving a task than individual learning. The outcome of group learning is on average better than the best results from individuals solving the same task independently. It is necessary to mention here that learning is always an individual process, but the point is whether this individual process does or does not take place in the context of a group. In general, group learning is more effective since the individual may acquire the successful method of learning from the other members and everybody immediately obtains feedback on the achieved result, which contributes to motivating further learning. In group learning, especially in problem-solving, care must be taken that *all* members of the group contribute to resolving the task. Therefore, the combination of social and individual control is inevitable. Group learning may be effective only when all individuals participate. However, active collaboration in the class is a skill that may have to be taught.
2. Respecting a suitable milieu for learning plays a significant role. If the environment is not suitable, the effect of learning is reduced or even nullified. The problems of this topic have been dealt with in other monographs, and we shall devote a special section to this topic in this one too.

NOTES AND REFERENCES

1. Linhart, J. *Psychologické problémy teorie učení* [Psychological problems of the theory of learning] Praha, Akademie, 1965, p. 14-22.
2. Leont'ev, A.N. Obučenie kak problema psihologii [Learning as a psychological problem]. *Voprosy psihologii* (Moskva), No. 1, 1957, p. 3-17.
3. Leont'ev, A.N. Obučenie kak problema psihologii [Learning as a psychological problem]. No. 6, 1960, p. 6.
4. Linhart, J. *Psychologické problémy teorie učení* [Psychological problems of learning theory] Op. cit., p. 282-284.
5. Linhart, J. *Psychologie učení* [Psychology of learning] Praha, SPN, 1967, p. 14-17.
6. Skinner, B.F. The experimental analysis of behavior. *American scientist* (New Haven, CT), vol. 45, 1957, p. 343-371.
7. Skinner, B.F. *The technology of teaching*. New York, Appleton-Century-Crofts, 1968, 271 p.
8. Vygotskij, L.S. *Myšlení a řeč* [Thinking and speech] Praha, SPN, 1969, p. 167-244.
9. Travers, R.M.W. *Úvod do pedagogického výskumu* [Introduction to educational research] Praha, SPN, 1969.
10. Rubištejn, S.L. *O myslení a spôsoboch jeho výskumu* [On thinking and its research methods] Bratislava, SPN, 1960, p. 75-98.
11. Bruner, J.S. *O podstate a problémoch vyučovania* [On the substance and problems of instruction] Bratislava, SPN, 1968, p. 49-51.
12. Kováč, D. *Teória všeobecnej psychológie* [Theory of general psychology] Bratislava, Veda, 1985, p. 37-43.
13. Foppa, K. *Lernen, Gedächtnis, Verhalten* [Learning, memory, behaviour] Köln, Fed. Rep. of Germany, H. Huber Verlag, 1966.
14. Ďurič, L. *Výkonnosť žiakov vo vyučovacom procese* [Performance of pupils in the process of instruction] Bratislava, SPN, 1975, p. 54-90.
15. Thorndike, E. *Pedagogická psychologie* [Educational psychology] Brno, ÚSJU, 1929.
16. Skinner, B.F. *A tanítás technológiája* [The technology of teaching] Budapest, Gondolat, 1973, p. 157-171.
17. Bogojavlenskij, D.N.; Menčinskaja, N.A. *Psihologia usvojentija znanij v škole* [Psychology of the acquisition of knowledge in school] Moskva, Izd. APN RSFSR, 1959.
18. Rubinštejn, L.S. Op. cit.
19. Landa, N.A. *Algoritmy a učení* [Algorithms and learning] Praha, SPN, 1973.
20. Galperin, P.J. *Výber z diela* [Selected works] Bratislava, Psychodiagnostické a didaktické testy, 1980, p. 11-47.
21. Smirnov, A.A. *Psychologie* [Psychology] Praha, SPN, 1959, p. 307.
22. Woodworth, R.S.; Schlosberg, H. *Experimentálna psychológia* [Experimental psychology] Bratislava, SAV, 1959, p. 729-730
23. Anohin, P.K. Osobennosti afferentnogo apparata uslovnogo refleksa i ih značenie dlja psihologii [Specificities of afferent apparatus of the conditional reflex and their meaning for psychology] *Voprosy psihologii* (Moskva), No. 6, 1955, p. 16-38.
24. Talyzina, N.F. *Teoretické problémy programovaného učení* [Theoretical problems of programmed learning] Praha, SPN, 1971.
25. Smirnov, A.A. *Problémy psychologie pamäti* [Problems of the psychology of memory] Bratislava, SPN, 1969.

CHAPTER FOUR

Psychological aspects of developing creative thinking among pupils and students

Since the 1950s psychologists have been concentrating on the question of creativity (this date coincides with the origin of a new psychological discipline – the psychology of creativity). Psychology approaches the subject of creativity from both the theoretical and the practical angle, while both spheres often overlap.

Most attention has been concentrated on the following topics:

1. Basic theoretical and methodological foundations for the development of creativity.
2. The concept of creativity.
3. The characteristics of creative abilities.
4. Intelligence and creativity.
5. The development of creativity; stages in the creative process and levels of creativity.
6. The direction of creative thinking in pupils and the position of a creative pupil in the classroom.

BASIC THEORETICAL AND METHODOLOGICAL FOUNDATIONS FOR THE DEVELOPMENT OF CREATIVITY

As an introduction to the psychology of creativity, it is necessary to mention the psychological principles which educational psychologists, teachers and educators have adopted as the starting-point for the purposeful development of creativity, especially by pupils and students. The basic principles are as follows:

1. Every mentally healthy individual disposes of a certain level of creativity. However, levels of creativity differ.

2. Creativity (creative thinking), in common with every other psychic phenomenon, develops through activity (play, learning, work). Play is dominant for pre-school-age children and forms a foundation for the development of their creative potential. The principal activity of pupils and students in school is learning, therefore their creativity may be most efficiently developed through the educational process during learning under the guidance of teachers and educators.
3. Inculcating creativity or creative thinking in pupils and students forms an integral part of educating the whole personality.
4. The psychological objectives of creativity education should conform to the general educational objectives aimed at bringing forth an all-round and harmoniously developed personality. Within this perspective, the psychological objectives of creativity education may be considered as contributing elements.
5. The global educational-psychological purpose of developing creativity in pupils and students is represented by the formation of a creative personality in the sense of being able to work in an efficient manner, displaying acceptable and progressive social behaviour, but especially taking responsibility for one's own self-education.
6. Those principally involved in developing creativity in pupils and students are teachers and other educational staff who have been trained for this activity at teacher training institutions and/or in various post-graduate courses.

THE CONCEPT OF CREATIVITY

The psychology of creativity was first researched in the 1950s. In 1950 the American psychologist J.P. Guilford gave a lecture on creativity to the Congress of the American Psychological Assocation which stimulated interest in this aspect of the human intellect. He himself pointed out the direction and methods of research. Another significant researcher in this field is E.P. Torrance [1].

According to the Polish psychologist Z. Pietrasiński [2], there are many psychologists who allege that creativity is an activity leading to as yet unknown but socially valuable outcomes.

The Czech author J. Hlavsa [3] uses as the point of departure for his definition of creativity the process of 'creativization'. He states that creativity means a change in the subject/object relationship whereby a synthesis of a person's external influences and internal attitudes brings about an alteration of the subject's specific activities leading to creative, new, progressive and communicable outcomes, which are also reflected as personality changes.

This definition is acceptable to us since its formulation corresponds to our conception of educational, school and teacher psychologies, and is applicable to psychological problems of creativity education. It is based on Rubinštejn's theory of refraction, according to which external influences are refracted through the subject's internal attitudes.

THE CHARACTERISTICS OF CREATIVE ABILITIES

The substance of creativity will be better understood when the basic characteristics of this intellectual ability of man are described. A concise analysis of the model of intellectual structure proposed by the founder of the psychology of creativity, J.P. Guilford, will also be helpful in this respect.

The model (Figure 6) has the form of a rectangular solid with three edges of varying lengths. All intellectual abilities are arranged according to three dimensions. They are: (a) intellectual operations; (b) intellectual contents; (c) intellectual products.

Intellectual operations are as follows:

1. Cognition (discovery or recognition of something).
2. Memory (preservation of what has been acquired or discovered).
3. Divergent thinking (thinking in various directions and searching for different solutions).
4. Convergent thinking (leading to a unique solution in the only way).
5. Evaluation (the best, or the most correct, thought, approach, image, conclusion, etc., is determined).

The intellectual contents of the Guilford model are:

1. Figural (they reflect the size, the shape, the colour, the structure of an object thereby leading to visual perception).
2. Symbolic (expressed in numerals, letters or agreed symbols, as in mathematics).
3. Semantic (expressed in language and images, as in literature)
4. Behavioural (they reflect so-called social intelligence, social relations, intellectual communications, etc.).

Intellectual products represent the outcomes of the preceding two dimensions. They are:

1. Units (shapes, symbols that have been produced).
2. Classes (formed from product units).
3. Relations (formed between units and classes).
4. Systems (originating as outcomes of the structure composed of units, forming a firmly organized whole).
5. Transformations (meaning changes, modifications of information).

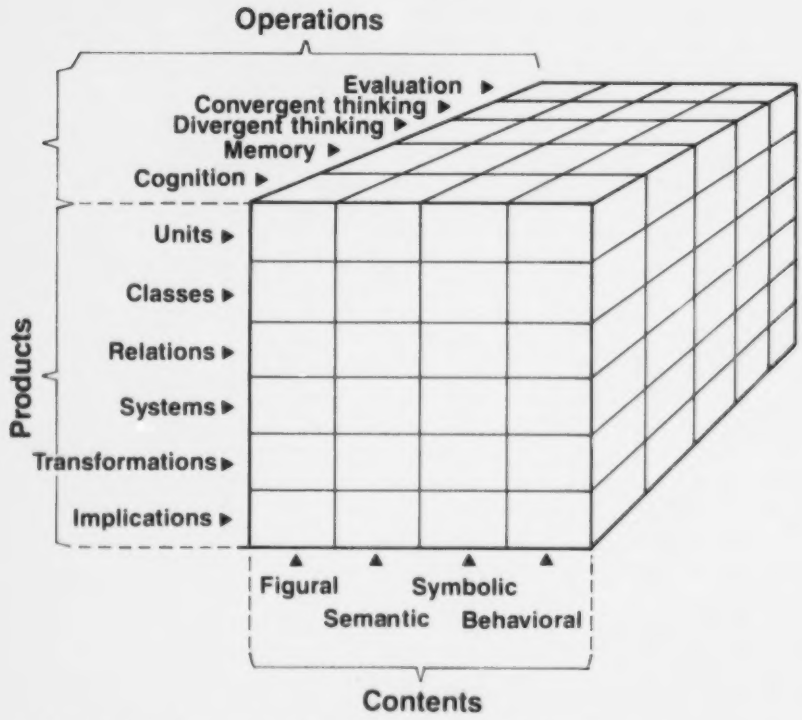

FIGURE 6. Model of intellectual structure according to J.P. Guilford [4]

6. Implications (conclusions and forecasts inferred from other information).

In the model shown in Figure 6, which has undergone further modifications, the individual influences on the three dimensions can mutually intersect and thus form as many as 120 small cells, each of which corresponds to one hypothetical elementary ability with three characteristics. This ensures the uniqueness of an elementary ability, determined by one kind of operation, one kind of content and one kind of product. In this way, for example, the memory (operations) of symbolic (contents) classes (products) may arise.

The basic faculties of creativity include fluency, flexibility, originality, sensitivity, redefinition and elaboration.

Fluency means the ability to form with facility as many psychic products as possible of a certain kind (words, ideas, figures, symbols, etc.) in a given time.

Flexibility is the abiliy to come up with various solutions to problems and to overcome rigidity in thinking. Pietrasiński [5] introduces examples of flexible thinking from his own experiments. The pupils were given the task of writing (or saying) as many uses of a volleyball as possible in three minutes. On the basis of their answers he chose from among his subjects three typical cases. The first pupil proposed that the volleyball may be used for: (a) volleyball; (b) for basketball; (c) for football, (d) for any ball game with two teams; and (e) for handball. The second pupil suggested that the same object could be used for: (a) playing in a meadow; (b) other sports games; (c) sitting on; (d) a drum; and (e) swimming. The third pupil indicated the following uses: (a) a weight; (b) a globe, (c) a decoration; (d) a toy; and (e) a musical instrument.

The data show that all three pupils produced five answers each, but, from the point of view of flexibility, the answers of the third pupil are the most interesting since they neither introduce the original purpose of the ball nor that of any other ball games. Every answer given by this pupil represents a totally different way of using the volleyball. The pupil managed to release himself completely from the confines of obvious solutions (rigidity).

Originality means the ability to form clever, ingenious, unusual, extraordinary ideas, which yet hint at distant connections. This is one of the most fundamental factors of creativity, since the original creative process leads to original ideas. The point is not simply an original idea, but, even more so, an original solution.

The following examples are used in ascertaining the level of originality:

Headings to stories. The task is to make up original headings to short events or stories. For example: 'There is a boy living in a countryside who is only 3 years old, but he can read, count and play the piano.' The ingenious (original) headings to such a story may be: 'a puzzle for the scientists'; 'a new Einstein'; 'boredom at school; 'does he know how to play?', etc.

Inventing original consequences of unusual events (tests of consequences). These events should be of the most fantastic character, e.g. 'What would happen if people suddenly acquired the ability to pass through walls without hindrance?' Tasks for ascertaining originality are similar to those for ascertaining the level of ideational fluency (readiness) and certain kinds of flexibility. However, they differ on the point that the answers should be unusual with ingenious but distant associations; they should transform the conceived story and point out a different interpretation of the information contained in the story.

Sensitivity to problems is the ability to notice and perceive the problem before others notice it or see it. Here is an example of sensitivity in mathematics: one side of the triangle is 12 cms long; give the lengths of its other two sides so that it would be impossible to construct the triangle, and demonstrate why! There

are several possible answers, among which are (a) = 12 cms, (b) = 6 cms, (c) = 5 cms; or (a) = 12 cms, (b) = 9 cms, (c) = 2cms and so on. The proof is that (b) + (c) should be greater than (a)!

Another example from mathematics: construct a triangle when angle $<\alpha = 90°$, angle $<\beta = 45°$ and angle $<\gamma = 50°$. The pupils who is sensitive to problems will immediately notice that there is no solution since the sum of the inside angles of the triangle does not equal 180°.

The level of sensitivity can be measured by tests, e.g. the test of apparatuses, consisting of two parts, each part containing ten apparatuses (the time available is seven minutes). The task is to suggest two ways of improving each apparatus. For example: 'In what way would you improve the telephone?' A sensitive answer: by mounting a device on it that would tell you who is calling before the receiver is lifted.

By *redefinition* (restructuring, reformulation) we mean the ability to transform the purpose of objects or their parts, to use them in different ways, to free oneself from customary ways of problem solving.

The tasks set before pupils may include the transformation of purpose. For example: there are five objects (a ruler, a glass-pipe, a stick, a pencil and a lighter). Which of these objects may be used for producing a musical note? The glass pipe can be used to this purpose if we close it at one end and blow across the open end.

In order to develop creative ability for redefinition it is possible to use the method of relating objects, i.e. two different kinds of objects are brought together and their juxtaposition leads to the production of a new object. For example, a nail and a stick may give rise to a waste-paper picker, a fishing rod, a javelin, a boat hook, a personal weapon, etc. Many tasks of this kind may be invented.

Joining words also represents a suitable way of developing the ability to redefine. For example, the task may be to write a story based on ten given words: club house, village, fruit, square, meeting, quickly, grass, sweet, voluntary worker, garden. There are many possible combinations.

Elaboration in creativity is conceived as the ability to propose elements of solutions to complete a certain whole. For example, a chain of associations suggested by the initial and the final words must be completed to form a sequence: 'work, —, —, —, an orange'. The three missing words may be 'earnings', 'money', 'food', for example.

Another kind of exercise may require that a very simple drawn line should be complemented by other lines to form a certain whole.

* * *

We have introduced the basic abilities of creativity. They are not all of the same character and significance in the creative process. They are not all based on divergent thinking. These are the abilities proposed by the founders of the psychology of creativity, Guilford and Torrance. The Soviet psychologist A.N. Luk [6] analysed creative abilities in detail and developed them into thirteen groups. They are as follows: (a) perseverance in searching for problems; (b) the ability to condense thinking operations; (c) the ability to transfer experiences; (d) the ability to perceive the whole; (e) the ability to associate concepts; (f) readiness of memory; (g) flexibility of thinking; (h) the ability to evaluate and sum up the situation; (i) the ability to integrate and dissect; (j) the ability of easy generalization of thoughts; (k) the ability to anticipate; (l) fluency in speech; (m) the ability to complete the activity.

We have introduced six of Guilford's and thirteen of Luk's abilities which form the basis of creative thinking. Let us consider now the abilities of Guilford (fluency, flexibility, originality, sensitivity, redefinition and elaboration) in relation to individual phases of the creative process. For example, for the *preparatory phase*, sensitivity and then flexibility and originality are inevitable. For the *incubatory phase* fluency and flexibility are important. The *intuitive phase* requires sensitivity, fluency, flexibility, but especially originality. For the last phase of the creative process, i.e. the *evaluatory phase*, perhaps the factor of redefinition (oral or written interpretation) is the most significant. These stages of the creative process are still to be dealt with.

INTELLIGENCE AND CREATIVITY

Creativity represents a higher level of man's intellectual abilities than intelligence. The difference lies in the fact that creative ability means being familiar not only with new problems, with selecting ways of resolving them, with the transition from one situation to another, with the mobilization of previous experience (as is the case with intelligence), but principally with the 'invention' of new, original and unusual solutions, and, what is more, with the identification of new problems. This represents the divergent way of thinking, which can be measured by tests of creativity (creative thinking).

Creativeness is noted for original processes and original products. Intelligence measured by intelligence tests requires the very opposite, namely an identical response from all who set out to solve the set task correctly. In classical tests of intelligence there is no scope for originality, for perceiving things in new ways, for independent observation of problems and the formation of new problem situations. Tests designed to measure the level of creativity are quite different. They are constructed with the idea of provoking divergent thinking to a maximum degree.

Since the 1960s special attention has been devoted to the relationship between level of intelligence (IQ) and creativity, as indicated by Table 1 based on a survey made by Hungarian psychologists J. Barkóczi, A. Oláh, and T. Zetényi [7]:

TABLE 1. Relationship between level of intelligence and creativity

Sample	Correlation	Authors
10-13 years old	0.26-0.35	Getzels and Jackson, 1962
	0.16-0.32	Torrance, 1962
	0.03-0.14	Pankove and Kogan, 1968
	0.01-0.51	Kogan and Morgan, 1969
14-16 years old	0.26-0.29	Owens, 1964
	0.30-0.48	Bowers, 1966
	0.13-0.14	Dewing, 1970
University students	0.07-0.08	MacKinnom, 1965
	0.02-0.44	Nichols, 1971

The data were obtained by means of various tests of intelligence and creativity, using various age groups. The surveys shows that correlation values fluctuate around 0.30, reflecting a moderate relation between level of intelligence and creativity. In other words, creative thinking is little dependent on intelligence; creativity forms a uniform intellectual dimension. F. Barron [8] found out that the tendency towards creativity is selective from the point of view of intelligence, and therefore the creative abilities of personality also have a higher IQ level. Barron suggests the positive correlation of 0.40 for the whole IQ scale. Above the IQ value of 120, the effect of intelligence is negligible for creativity.

In trying to resolve the relationship between creativity and intelligence, the authors agreed in distinguishing four basic groups: (a) a high level of creativity and of intelligence; (b) a high level of creativity and low level of intelligence; (c) a low level of creativity and high level of intelligence; (d) a low level of creativity and of intelligence.

While it is generally accepted that high intelligence may be combined with a lower level of creativity, a high level of creative thinking does not usually occur in combination with a very low level of intelligence.

THE DEVELOPMENT OF CREATIVITY

Relationship between the level of intelligence and the progress of pupils in school

As is also stated in the expert literature, teachers take more of a liking to intelligent pupils, as well as to those who are more conformist than to highly creative pupils who are non-conformists. Highly intelligent pupils do not present problems, while highly creative ones do, and so teachers tend to evaluate the work of the former more favourably than that of the latter. This observation about our schools is based on the results of our own research [9]. However, we are aware that the level of progress by pupils in schools also depends upon factors other than creativity or intelligence.

Research was conducted on the relationship between the pupils' levels of intelligence and their progress at primary and secondary schools. Analysis of the results disclosed the fact that there is a statisically significant relation between intelligence (convergent thinking) and school marks. These results are made more valuable by being congruent with the findings of other researchers (Blejcher and Burlačuk [10] and Jurčo [11]), in spite of the fact that the way they measured the intelligence level of pupils was different from the method used by us.

Relationship between the level of creativity and the progress of pupils in school

As with investigating the relationship between level of intelligence and progress in school, the relationship between the level of creativity and school progress was also investigated — at the same time, at the same schools, with the same pupils being taught by the same teachers [12].

In general, we can conclude that the results obtained testify to relatively low correlations between level of creativity (originality) and the averages of school marks in all grades. This means that progress in school (marks) cannot be considered as a reliable indicator of pupils' creative abilities, especially as far as originality is concerned. The data point out that the school was less active in encouraging pupils' creative thinking than it was in developing convergent thinking, i.e. the level of their intelligence.

Phases in the creative process

Creative skills are achieved in certain stages by the creative personality. These stages were identified on the basis of studying statements by inventors and on the basis of research data. The following stages of the creative process were determined:

1. *The preparatory phase*, in which we become aware of the problem and look for means of solving it.
2. *The incubatory* (latent) *phase* in which the major role is often played by the subconscious activity of the 'solving' individual. An important contribution in this phase also comes from intuition.
3. *The illuminative* (inspiratory) *phase* is typified by suddenly finding the solution to the problem. It is associated with a relaxation of the state of tension and is considered to be the peak of the creative process. Inspiration applied in this phase is the outcome of the creator's hard creative thinking.
4. *The verification phase* is the final phase of the creative process. Evidence of a correctly solved problem is a strong motivation for further activity by pupils or, at least, it evokes a pleasant feeling of success.

Levels of creativity

The creative personality can best be understood if we acquaint ourselves with its development during creative activity. In this domain there are still many problems yet to be resolved, especially for developmental psychology. The original conception of the creative personality had five developmental levels. They are as follows:

1. *Expressive level of creativity*, characterized by spontaneity and freedom. This is typical of children at the pre-school age.
2. *Productive level of creativity*. On the basis of expressive creativity, the individual acquires (learns) certain ways, techniques and expressions for his *ideas*. Spontaneity and freedom retreat and the creative individual confronts his *ideas* with reality on an interactive level.
3. *Discovering level of creativity*. The creative personality already operates with its own creative skills. The substance of this creativity already forms discovery. The individual discovers something new from past knowledge. New problems are revealed, new problem situations, which the less creative individual will not notice. Of course, with younger pupils this discovery is still often subjective; they may not realize that someone else may have already discovered it before them. The background of this level of creativity adds to the individual's previous experience acquired in the process of learning.
4. *Innovating level of creativity*. The individual already perceives and comprehends the basic principles of the causal-consequential relations of problems, either in the sphere of art, science or practical activity. Only on the basis of comprehension of these principles is it possible for man to put into practice the changes leading to innovations and improvements in what already exists at a high level.

5. The highest level of creativity is called *the emergency level*. This level is attained by very few people (perhaps only genuises). At this level new scientific or artistic schools of thought, theories and trends arise. Previous knowledge and notions are re-structured, since every work of genius has its history.

THE DIRECTION OF CREATIVE THINKING AND THE ROLE OF THE CREATIVE PUPIL IN THE CLASSROOM

Creative thinking by pupils in schools is mainly directed by means of guided learning (education and instruction). This also means that, in this kind of educational process, it is important for pupils to learn in a modified and special form. These conditions are connected with the pupil's and the teacher's creative personalities, with the learning material and with the milieu in which this process is taking place.

The creative pupil

The contemporary psychology of creativity has considerable data on creative personality traits. Experts consider that the basic personality trait required of a creative individual is the *need* to create, which is composed of several facets, such as:

1. The need for above-average intellectual activity, active participation, creative ideas, problem-solving and creative work. (This need is already evident in childhood. Highly creative children differ from children who simply have a high level of intelligence.)
2. The need for security, recognition and stability. Creative individuals often suffer from insecurity and long for assurance, acknowledgement and permanence.
3. The need for constant information gathering and contact with the surrounding environment. The creative person stops believing in clichés.
4. The need for companionship, love and acknowledgement. Creative individuals often find themselves excluded from communities; they lose contact with other people and feel isolated. They try to compensate for this state of affairs by seeking close involvement in the community and searching for strong emotional bonds. Seemingly there is a contradiction: creative activity isolates, but a creative person does not want the 'loneliness of the long-distance runner'.

In this connection it is necessary to remark that, since the very origin of the psychology of creativity, researchers have concentrated on two traits common to highly creative people.

1. They analysed the personality traits of adult people who were already well known for their high levels of creativity (successful artists and scientists).

They studied their biographies in an attempt to identify their personality traits in childhood, their progress in school in individual subjects, their behaviour towards their fellow-students, parents, teachers, etc.;

2. By means of creativity tests, the levels of creativity in primary school-children and even in pre-school children were ascertained. The personality traits of those children displaying higher levels of creativity were observed, utilizing psycho-diagnostic personality tests and questionnaires.

Both approaches have contributed a multitude of data which have enabled the personality traits of highly creative individuals to be described with some certainty.

A survey of these traits has been conducted by a Hungarian psychologist, E.S. Gergencsik [13]. In her monograph, the characteristics of highly creative individuals are listed as follows: (a) sound mental health and intellectual efficiency (thirst for knowledge, curiosity, interest, independent attitudes of thinking and behaving); (b) the desire for and tendency towards self-expression; (c) a positive self-concept; (d) psychical stability ; (e) personal freedom which is opposed to limitations; (f) the endeavour to improve the environment in a constructive way; (g) non-conformity; and (h) revolt against limitations, dependence and regulations.

These character traits contribute positively to creativity but it often happens that for companions in life (parents, teachers, schoolmates, fellow workers) such people are viewed as rebels who reject traditions and who disrupt social regulations and norms. It may then happen that the interpersonal relations between a creative personality and his/her peers are broken, leading to even greater rebellion and, in due course, to isolation. Understanding on both sides is an inevitable requirement. In this connection we should recall the statement by a Soviet psychologist, G. Vorobjev [14]: 'Let us stop blaming our ancestors for not having promptly grasped the merits of Copernicus, Christopher Columbus or Cézanne. We would do better to pay attention to our own "odd fellows", and let us not do them any harm'.

The creative personality of the teacher

It is generally acknowledged that, as in other fields, in order to develop creative thinking among pupils, the first and basic prerequisite is for the teacher to know what it is to be creative. We cannot develop what we do not understand and know nothing about — or not enough. Therefore, the primary task of teachers and educational staff in general is to acquire basic knowledge on creativity, on the psychology of creativity, and on possibilities for its inclusion in the curricula of schools and other educational institutions.

Another task for teachers is to respect the creative personality of the pupil. This is not easy. It may happen that in a class there are two or three above-

average pupils whose creative approach to solving tasks presented to them is unusual, not respecting habitual, stereotyped procedures. These pupils must not be oppressed for their creative approach to learning activity.

Teachers must also learn to be creative in their educational activity. If the teacher is not creative, it is hardly possible to develop the pupil's creativity. The educational process in school is a bi-polar process. One pole is formed by the teacher, the other by the pupil. There should be interaction between them; they should influence each other mutually.

As far as creativity is concerned, the training of teacher educators and other educational workers should, according to Bližkovský [15], consist of the following stages:

1. (a) Acquisition of educational knowledge on facts, concepts and terms; knowledge of the expert terminology;
   (b) an exact comprehension of educational phenomena;
   (c) intellectual capacities which are inevitable for a theoretical analysis of education;
   (d) acquiring sound habits of mental activity.
2. (a) Development of sensory and intellectual abilities of educational staff (observation, imagination, attention, care, memory, intuition, criticism, anticipation, etc.);
   (b) efficient study habits;
   (c) the essentials of creative educational thinking and theoretical creativity in general.
3. (a) The needs and abilities of constant theoretical self-education (higher level of mental work, i.e. application of scientific, technical and cultural knowledge in education and in life);
   (b) higher degree of educaional theoretical creativity and scientific creativity; self-expression in these activities.

Developing creativity

Since the time psychologists and educators throughout the world first started paying attention to creativity and creative thinking, one of their main priorities was the selection and description of learning materials that would enhance the learner's creativity. There are many psychologists who deal with this problem, but more particularly in the out-of-school context and not so much in connection with pupils learning directly during a lesson in the classroom.

Learning materials in mathematics and the language of instruction have received most attention from psychologists and educators. In modern teaching the pupils, under the guidance of the teacher, act with considerable freedom and are able to handle objects and teaching aids with liberty. Even though

their activity is guided, they are encouraged to discover new knowledge and formulate it by themselves. Teaching of this kind provides them not only with factual knowledge, but also helps them to familiarize themselves and to take note of objects and phenomena, to approach problems without fear; in fact, to seek them out and to solve them. They are taught to feel joy in solving the tasks set them, and to be curious and open. Their interest is aroused. Besides intellectual development, social relations among the pupils are also fostered. Pupils get to know their abilities and compare them with their school mates; they gain self-confidence, have no fear and learn to learn from their mistakes. Instruction of this kind influences the development of a pupil's personality as a whole, not only on an intellectual level. Therefore one of the main tasks of psychologists is to help with the creation of new textbooks, so that they contain as many different tasks as possible.

A creative environment

Learning aimed at the development of creative abilities requires a special psychic atmosphere. Even here the principle of interaction between personality and environment is in force. This means that the more creative the atmosphere of the milieu in which the pupil learns and is educated, the better the conditions for the development of his/her creative abilities, and vice versa.

Traditional schools did not make it possible even for creative teachers to cultivate a creative atmosphere in the school, the class or during lessons. Modernization of the school system should cater for this aspect. However, these are only resources. Their utilization for the development of creative thinking among pupils, with the aim of setting up a creative atmosphere in the school, requires a change in the approach of teachers, school administrators and educational authorities.

Education for creativity and the proper encouragement of a creative atmosphere in school necessitates the inclusion of the *psychology of creativity* into the curricula of all teacher training institutions, within post-graduate training courses for teachers, and refresher courses for educational managers. Literature on this subject is already available in the majority of countries.

The creative pupil in the classroom

One of the basic tasks of the school is to educate creative personalities, creative workers for every field of economic, cultural and social life. The power of an individual lies in being a member of the community, and the power of the community is ensured by the activity of the greatest number of socially oriented and highly creative individuals.

In connection with the education of people who think and act creatively in both the interests of the community as well as their own, there are still some psychological and educational problems which have not been entirely resolved. This is perfectly comprehensible since the psychology of creativity is a new, young discipline, while we already know more about the psychology of education in the community, though even here there are still plenty of opportunities for further research. In connection with creative education or education of a creative and community-oriented personality, the following issues deserve attention: (a) the relation between creativity and the community; (b) the possibilities of adjusting education for creativity with education for the community.

The relationship between creativity and community

Community education and creative education in school represent two aspects of one and the same thing, i.e. the whole complex of education. Further development of society requires the education of both social and creative people. Of course, the level of creativity and creative thinking of every pupil is not and cannot be the same.

It is interesting that pre-school-age children manifest both creativity and a community spirit. We can observe their creative play in the group of their companions. What games can they make up together? What 'philosophical' questions can they ask and how can they answer them together?

In school the pupil becomes a member of a formal group within which informal sub-groups may arise and, only later on, under the influence of the teacher and the youth organizations, a proper community is formed. Until that time conflicts may occur between highly creative pupils and the others. These conflicts may be provoked by certain personality traits of highly creative pupils not shared with other less creative, but more social, pupils.

Possibilities for the creative and collective education of pupils

The development of a collective feeling or a social ethic passes through certain natural stages. For example, we know that the infant is more likely to conform than the adolescent. With the small child the acknowledgement of adults is of great importance, often greater than the fulfilment of the task itself. The adolescent is in general more non-conformist: he/she longs for independence, is discontented, is critical towards adults, etc. But even at this stage of development the role of education is decisive.

In properly conceived social education there is no conformity. When there is respect for individual characteristics and when differing levels of creativity and creative thinking among pupils are tolerated, then social education will

not result in uniformity. The uniformity of education (disliked by highly creative pupils) occurs when the relation between the individual and the community is wrongly conceived and carried out in practice; and there are times when this still happens.

Psychology points out the ways in which, under the teacher's guidance, both community feeling and the creative thinking of individuals within the class group may be encouraged. They include, particularly, the following possibilities:

- the creative pupil participates in the activities of the class, assuming a significant position or collaborates actively;
- the sincerity and broad interests of the creative pupil are used to advantage by his classmates;
- the creative pupil should be aware that the strong desire for self-expression can only be tolerated in a healthy community;
- the creative pupil, full of practical jokes and wit, may evoke a happy atmosphere in the whole community, thus suppressing the tension and anxiety present in other pupils, and contributing to the joyful solution of problems;
- the enterprising spirit of the creative pupil and his activity may in many cases be profitable for the community as a whole;
- acceptance on the part of his classmates reinforces the creative pupil's personality, even though this may not be the principal motivation towards further creative activity;
- the independent judgement, intellectual abilities and independent opinions of the creative pupil may serve as an example for other, less creative members of the class.

To conclude this chapter, we refer to the statement that a good community of pupils should not normally be disrupted by the creativity and creative thinking of its individual pupils. If there are some contradictions, they must be conceived dialectically as a driving force of development by creative individuals in favour both of themselves and of the whole class.

NOTES AND REFERENCES

1. Torrance, E.P. Education and creativity. *In*: Taylor, C.W., ed. *Creativity: progress and potential*. New York, McGraw Hill, 1964, p. 49-128.
2. Pietrasiński, Z. *Tvorivé myslenie* [Creative thinking] Bratislava, Obzor, 1972, p. 8.
3. Hlavsa, J., et al. *Psychologické problémy výchovy k tvorivosti* [Psychological problems of creativity education] Praha, SPN, 1981, p. 25-26.
4. Guilford, J.P. *Natura inteligencji człowieka* [The nature of human intelligence] Warszawa, PWN, 1978, p. 140.
5. Pietrasiński, Z. Op. cit. p. 114-115.

6. Luk, A.N. *Psychológia tvorivosti* [Psychology of creativity]. Bratislava, Pravda, 1981, p. 98-100.
7. Barkóczi, J.; Oláh, A.; Zetényi, T. Az inteligencia, a kreativitás és a szociookonómiai status osszetuggéseirol [Intelligence, creativity and socio-economic status] *Magyar pszichológiai szemle* (Budapest), xxx. év., 4. sz, 1973, p. 522-523.
8. Barron, F. *Creativity and psychological health*. New York, Van Nostrand, 1963.
9. Ďurič, L., et al. *Naša škola a rozvoj tvorivého myslenia žiakov* [Our school and development of creative thinking of pupils] Bratislava, SPN, 1984, p. 49-54.
10. Blejher, V.M.; Burlačuk, L.P. Psichologičeskaja diagnostika intelektu i ličnosti [Psychological diagnostics of intellect and personality] *Výšča škola* (Kijev), 1978, p. 25-46.
11. Jurčo, M. Vzťah medzi výsledkami v inteligenčnom teste, školskými známkami a inými ukazovateľmi u žiakov 9. ročníka základnej školy [Relation between intelligence test results, school marks and other indicators of ninth grade pupils in elementary schools] *Psychológia a patopsychológia dieťaťa* (Bratislava?), No. 2, 1969, p. 38-53.
12. Ďurič, L., et al. Op. cit., p. 54-64.
13. Gergencsik, E.S. Kreativitás és közösség [Creativity and collective] Budapest, Tankönyvkiadó, 1987, 238 p.
14. Vorobjov, G. *Človek je tvor zložitý* Man is a complex being] Bratislava, Pravda, 1982, p. 55.
15. Bližkovský, B., et al. *Profesionalizácia učiteľského vzdelávania* [Professionalization of teacher education] Bratislava, ÚÚVU, 1984, p. 29-35.

CHAPTER FIVE

Performance and fatigue among pupils and teachers

Over the last two centuries, the problems of fatigue have been dealt with by many researchers adopting various scientific approaches. In spite of a great number of experimental and theoretical studies, it is even nowadays still not quite clear what fatigue is, what causes it, what its basic mechanisms are, where its seat is, etc.

Clarification of these issues has both theoretical and practical significance. The organization of man's activity to ensure the best performance would be impossible if we were not able to clarify these issues.

THEORIES OF FATIGUE

In the second half of the nineteenth century and at the beginning of the twentieth, various views on fatigue were put forward and various theories of fatigue upheld. These theories may be roughly divided into two groups.

The first group includes views which consider the substance of fatigue to be connected with the working organs themselves, or with other systems. They are represented by the following theories: (a) theories of toxins; and (b) theories of losses of energy resources in functioning organs. This group may be called the humoral-localistic group of fatigue theories.

The second group includes the central nervous theory, which proposes that the substance of fatigue lies in changes of activity in the central nervous system, especially its cortex.

Humoral-localistic theories

The point of departure for representatives of humoral-localistic theories is the empirical notion according to which the repeated and continuous activity of

working muscles causes fatigue. With fatigue the muscles get weaker, their activity slackens, and the painful feeling of weariness appears in them. This notion led the representatives of localistic theories to conclude that fatigue is a process taking place first of all in muscles, i.e. on the periphery of the body. Fatigue, according to them, represents a change in the properties of the muscles themselves resulting from activity, so that local changes in muscles following their activity represent the cause of fatigue. This view was introduced by R. Woodworth and H. Schlosberg [1].

Representatives of the peripheral theory supported their arguments with measurements made on an ergograph constructed by a professor of physiology from Turin, A. Mosso (1846-1910). The ergograph measured fatigue in one finger lifting a certain weight, while the other fingres of the hand were kept immobile.

On the basis of measurements on a nerve-muscle preparation as well as ergographic measurements, it was concluded that the cause is to be looked for in the isolated muscle used in the experiment. One group of investigators alleged that it was the nerve that became tired in these experiments, while others alleged it was the muscular tissue.

As far as fatigue in a nerve-muscle preparation is concerned and attempts to clarify this issue, the experiments of the Russian physiologist N.J. Vvedenskij are significant.

Vvedenskij [2] made a series of experiments with nerve-muscle preparations. His telephonic investigations of electrical phenomena in muscular and nervous systems are well known. Vvedenskij found out that nerve fibre in the nerve-muscle preparation was almost fatigue resistant. Lability of the nerve fibre in the nerve-muscle preparation of a frog was 500 oscillations per second. Therefore it was incorrect to attribute fatigue of the nerve-muscle combination to nerve fibre.

Vvedenskij disclosed another interesting phenomenon in his experiments. A muscle that had ceased to respond to strong electrical stimulation began to work intensively again as soon as the rate of electrical stimulation was reduced. Similarly, when the muscle stopped contracting after a very high frequency of stimulation, it was sufficient to lower the frequency for the muscle to start contracting again.

It may be concluded then that the very strong and frequent stimulation of nerves brings about a state of inhibition of motor nerve end-plates, according to Vvedenskij's law of optimum and pessimum concerning the lability and functional mobility of the tissue. The higher the functional mobility of the tissue, the more frequent and stronger stimulation it may receive and conduct. However, when the impulses are too frequent or too strong, the phenomenon of pessimum succeeds and the tissue stops conducting impulses. A special state of non-response, called 'parabiosis' by Vvedenskij, arises in the tissue.

The phenomenon of parabiosis is characteristic of certain kinds of inhibition. We are then talking about inhibition and not fatigue, as the representatives of peripheral theories of fatigue presumed.

To conclude the debate on these theories it may be said that their drawback was not only in the localization of fatigue in individual parts or organs of the body without taking into account the organism as a whole, but also the fact that they had mistaken fatigue for phenomena, states and processes that had nothing to do with it.

The theory of toxins

This theory of fatigue is very ancient. It was proposed that the causes of fatigue were poisons accumulated in the blood or in working organs following activity. The toxic products are partially oxidized in the muscle itself, partially washed away by the blood flow and oxidized in it, and partially transformed back to their original state. If the working load is too high and many muscles are involved, or activity is sustained over a long period of time, the transformation or draining of these by-products is not sufficiently fast, and they accumulate in muscles, cause fatigue and in due course reduce efficiency.

Fatigue is then brought about by toxic by-products of metabolism that have not been carried away from the organ during its work.

The main 'substances of fatigue' were considered to be various acids, especially lactic acid.

According to the theory of toxins there is a direct relation between the degree of fatigue and the quantity of lactic acid in the blood: the higher the quantity of lactic acid, the more tired the working organ becomes; on the contrary, if the quantity of lactic acid in the blood does not increase, the working organ does not get tired.

Let us take a more detailed look at the role played by lactic acid in the process of fatigue.

P.Z. Gulak [3] suggested that the presence of lactic acid or a change in its quantity in blood during a long period of activity, going on to complete exhaustion, does not provide a true picture of the degree of fatigue. For example, a marathon runner is extremely tired after a race, but the quantity of lactic acid in the blood does not corroborate this assumption. Changes in the quantity of lactic acid in the blood are negligible compared with such complete exhaustion.

Next, there is the issue of static and dynamic work. It is generally known that static work or static activity can tire a person more and faster than active work or movement. For example, holding the arms stretched out in front soon makes us tired. After a minute or two our hands fall by themselves and we feel exhausted.

If we accept the view that the quantity of lactic acid in blood is a decisive indicator of the degree of muscular strain, and thus fatigue, then after running a very long distance its quantity should be at its highest point. However, the scientific data of N.N. Jakovlev [4] pointed out that the opposite is the case. The quantity of lactic acid in the blood is highest after running short and medium distances. After long-distance runs the presence of lactic acid is only slightly different from what it was just before the physical activity began.

Another argument against the theory of toxins in fatigue is based on the fact that no author has found any increase in the quantity of lactic acid with fatigue associated with concentrated and continuous mental activity.

Another factor uprooting the theory of toxins is the so-called Sečenov's phenomenon of the beneficial influence of active rest. In experiments conducted on himself Sečenov [5] discovered that tired muscles recover faster when other muscles are working than during inactivity.

The theory of declining energy resources

According to this theory energetic and other important substances are exhausted during muscular activity. Reduced levels in muscles and blood result in muscular fatigue. The faster these energetic substances in working organs are exhausted, the faster is the decline in efficiency of these organs, and the faster is the onset of fatigue.

This theory of fatigue has already been superseded, but not completely rejected. Even nowadays it can be found in the pages of handbooks and studies on fatigue, though already not in its strictly local form. Even today, some authors still define muscular fatigue as a consequence of the prior expenditure of large amounts of energy in muscles. F. Engelsmann [6], for example, writes: 'Fatigue arises when the muscle expends more energy and oxygen than it is able to restitute'.

According to L. Riedl [7], a major role in diminished efficiency at the onset of fatigue is played by the shortage or reduction of muscular energy. Further, an important role is played by the loss of potassium, calcium, phosphorus, etc.

While the view originally prevailed that muscular fatigue was caused by exhaustion of the reserve of nutritious and energetic substances, which is restored during a state of rest, nowadays there are profound reservations about this theory based on research results.

First of all, it was proved that the onset of muscular fatigue preceded the biochemically demonstrable exhaustion of these substances in muscles.

Another important objection is represented by the fact that the expenditure of energetic substances and a whole series of metabolic changes take place in

the organism of man (in muscles as well) simply through imagining a wearisome activity — in other words during complete rest.

The mere reduction of energetic substances through physical activity cannot even elucidate such phenomenon as the increase of performance shortly before the end of a prolonged and exhausting physical activity.

Neither the theory of poisonous 'fatigue' substances (lactic acid), nor this second theory is able to explain why concentrated mental work affects both mental and physical performance. With mental activity we cannot talk of the expenditure of energy in peripheral muscles, since these muscles do not work or only very slightly so.

This theory of fatigue does not help to explain either Sečenov's phenomenon of active rest or abnormal and prolonged performance under hypnosis, or in desperate life-threatening situations.

Even though there are endocrinologists who are ready to take into account the role of the nervous system in controlling the function of endocrine glands, in principle they only admit to it in the case of the vegetative nervous system. Besides, they often hold the view of equivalance of the nervous and humoral systems.

The central nervous theory of fatigue

Fatigue as a phenomenon of the central nervous system was first pointed out in physiology by I.M. Sečenov. His statement was worded as follows: 'The source of the fatigue sensation is usually located in the working muscles; I am the only one to locate it in the central nervous system' [8].

According to I.P. Pavlov [9], the nerve cells of the cortex of the large cerebral hemispheres are most liable to fatigue, even in physical activity.

The cause of the rise of muscular fatigue is explained by V.V. Rozenblat [10] as follows:

1. The cortex cells must exert great efforts to send out impulses, 'orders' to the appropriate muscles. This endeavour brings about great losses of nourishment and energy reserves in cortex cells.
2. There are constant strong streams of excitation coming to the movement analyser. The force of these streams is dependent on the state of exertion of the muscles. Besides, the cortex receives a strong stream of excitation from internal organs, which grows with the increase of muscular exertion. Proprio-receptors lack the quality of adaptation and they intercept all changes in the organs in the form of excitation and send it out to the cortex. Processing all these impulses leading from the periphery to the cerebral cortex, and further transmission of directed impulses from the cortex to active organs, causes further exhaustion in the store of cortex cells.

3. The cortex also receives impulses from the muscles that reflect chemical changes occurring during their exertion. These impulses are intercepted by the so-called chemo-receptors. Chemo-receptors are very sensitive to various waste products, but especially to lactic acid. As a consequence, lactic acid has a toxic effect, not directly on the muscles, but through chemo-receptors and afferent routes on cortex cells, thus deteriorating their efficiency.
4. Muscular activity is accompanied by intensive activity in cardiovascular, respiratory and other systems. Such activity brings parallel changes in the state of cortex centres that react to and co-ordinate their activity, thus having a secondary influence on the change of activity in muscles.

As can be seen from the above, the operation of cortex cells in the large cerebral hemispheres in muscular activity is immensely complex and comprehensive. Their performance has its limits, however, and if these limits are exceeded the process of fatigue inevitably sets in. Fatigue of the cortex cells leads to a disturbance in the co-ordinative activity of the central nervous system and to a reduction in the body's overall efficiency. If activity continues, the losses of energy reserves in cortex cells cannot be restituted, fatigue becomes more profound and sets up a stimulus for the rise of protective inhibition in the cortex cells. If the respective centres enter a state of protective inhibition, further muscular activity is impossible. Protective inhibition defends the cortex cells from further exhaustion.

As a consequence of protective inhibition, the forces of restitution come into play and, due to them, the efficiency of the cells of the central nervous system is restored.

The central nervous system plays a leading role in the activity of the organism as a whole. This role is manifested in the direct and indirect management and co-ordination of the activity of other systems, in the reception, transmission and processing of external and internal stimuli, as well as in the formation of impulses for individual parts of the body. The role of the central nervous system remains decisive, even if other (humoral, biochemical, etc.) mechanisms play relatively important roles.

Fatigue arising as a result of the organism's effort to maintain equilibrium between the body and the environment is first of all a process involving the central nervous system. Fatigue is a biological signal warning against the threatening danger of disturbance to the normal activity of the central nervous system, and thus to the organism as a whole.

Some further notes on the theories of fatigue by V.V. Rozenblat: In the course of evolution of the animal kingdom the mechanisms of fatigue have undergone a series of changes. In early developmental stages, i.e. in lower forms of animal life, fatigue might have been caused and conditioned by the exhaustion of energetic substances. Later on, the evolutionary process gave rise to higher

mechanisms and their activity might have influenced the onset and profundity of fatigue to a decisive degree. The first mechanism of this kind might have been a product of metabolism, perhaps lactic acid, immediately affecting the muscles, thus changing their physical and chemical properties and in due course reducing their efficiency.

In the next stage of development, when the central nervous system started to play the main role in regulating groups of muscles, neuro-humoral activity became the basic mechanism of fatigue reducing the efficiency of active organs.

With higher animals, especially man, this development went on and the leading role was assumed by the central nervous system, especially the cortex; fatigue here reduces the efficiency of the organism before the onset of noticeable humoral changes.

The central nervous theory of fatigue provides great possibilities for combatting fatigue and raising the efficiency of pupils and teachers by means of psychic factors, as has been pointed out in our publications [11 and 12], as well as in some recent works by neuro-physiologists and psychologists.

Our definition of fatigue is as follows: 'Fatigue is a psycho-physiological state of the human organism arising as a consequence of its effort (with the regulating role played by the central nervous system) to restore the psycho-somatic functional potential, which is gradually being reduced through intensive or prolonged activity' [13].

MECHANISMS OF FATIGUE

Every theory of fatigue presents a different explanation of its mechanisms. According to the theory of losses of energy resources (as one of the humoral-localistic theories), the mechanisms of fatigue lie in a gradual decrease of energy resources in functioning organs. The representatives of this theory suggest that the higher the expenditure of these energy resources during activity, the greater the fatigue of functioning organs.

According to the theory of toxins (another humoral-localistic theory of fatigue), the basic mechanism of fatigue lies in the accumulation of toxic substances. During activity waste products are created, causing the onset of fatigue and thus often leading to a reduction in efficiency. The more waste (toxic) products are produced in the performing organ during its activity and the slower they are removed from the place of their origin, the higher is the growth of fatigue.

The central nervous theory has a different approach to the mechanism of fatigue. The representatives of this theory use as their point of departure changes taking place in the central nervous system, and thus in the living organism, during activity.

The representatives of the central nervous theory of fatigue (who are in the majority) suggest their own partial theories to mechanisms of fatigue. Their views have been analysed in detail by J. Sedlák [14]. These views include also the present author's theory of restitution.

Our theory of the mechanisms of fatigue used the works of G.V. Folbort, N.K. Vereščagin and V.V. Rozenblat as a starting-point [15]. According to their research, changes in cortex cells at the onset of fatigue may be represented as shown in Figure 7.

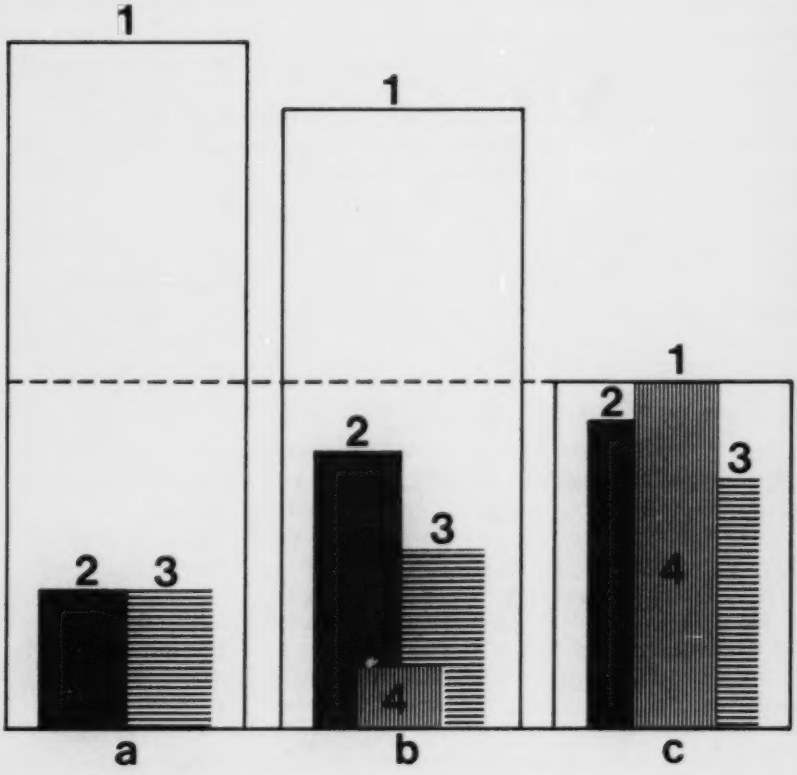

FIGURE 7. Diagram of changes in cortex cells at the onset of fatigue

According to this diagram, the process of the onset of fatigue contains three basic components:

1. The process of reduction (exhaustion) of the functional potential of cortex cells.
2. The process of the endeavour to restore the functional potential of cortex cells.
3. The process of protective (above-threshold) inhibition.

These components of fatigue are present in all human activity, especially when such activity is very intensive and prolonged. However, at particular stages of activity they are not equally represented. This means that in certain stages one component prevails, and other components at other stages.

In repetitive and prolonged activity by a person, first the process of reduction of the functional potential (functional efficiency) of respective cortex cells of the central nervous system arises and immediately induces the reciprocal process, namely the endeavour to restore functional potential. If the process of restitution is sufficient to restore the balance, the person does not experience fatigue, which means that subjective fatigue has still not arisen (the first part of the diagram). However, when the processes of reduction of the functional potential of cortex cells gradually start to prevail over the possibilities of the process to restore them, and when with even higher efforts of willpower these processes cannot be kept in balance, greater reduction of functional potential follows. At this stage of activity the processes of restitution begin to lag behind the processes of reduction of the functional potential of cortex cells (the second part of the diagram) and this causes subjective, later objective, fatigue, leading to a gradual decrease of efficiency (subjective and objective fatigue are defined two sections further on). In the following stage, the reduction processes of the functional potential of cortex cells are increased still more and, in a due course, the process of restitution as well (in the interest of the most efficient performance of the activity). However, the mutual combat of these two processes cannot last long since it might cause damage to the cortex cells and so, to protect them, the third process gradually appears, namely the process of the protective, above-threshold inhibition, blocking further activity by the person in the given direction (the third part of the diagram). The stronger the processes of restitution of the functional potential in the active stage, the faster and more intensively the processes of protective inhibition come into play.

The processes of protective inhibition represent a reaction to the restitution processes of nerve cells in the central nervous system.

This is the substance of the theory of restitution describing fatigue. The theory has been partially substantiated by experiments [16]. The theory suggests that we do not become tired primarily due to intense and prolonged activity, but particularly due to the fact that our internal mechanism attempts to restitute its forces (functional potentials) and it is actually the restitution that makes us tired. This is the aspect that we have also tried to express in our definition of fatigue. Fatigue is, first of all, the outcome of the combat of two

contradictory, dialectically mutually dependent processes of the human organism which, under normal circumstances, do not exist in isolation: the process of reduction (exhaustion) of the psychosomatic functional potential of the organism and the process of restitution.

A special problem is represented by psychic fatigue, psychic satiation and monotomy. We shall give a brief explanation of the difference between these phenomena on the basis of H. Schmidke's work [17], as well as on some of our own considerations.

Psychic fatigue means the state arising as a consequence of intensive (repetitive) psychic activity. The restitution of the original level of psychic efficiency causes the reversible reduction of performance and functions, influences other organic functions and may lead to disintegration of the psychic functions of the personality.

Psychic satiation represents a state of dislike, aversion or disgust by the subject towards performing a certain activity. The basic reasons for psychic satiation lie in the subjective attitudes of the individual who is to perform the activity (lack of interest, low motivation, too frequent repetition of the same activity). While psychic fatigue is hard to overcome (restitution takes a longer time), psychic satiation and over-satiation are, for the most part, easily and quickly eliminated.

The expert on monotony in working activity, A. Gubser [18], described it as a state of reduced psychic activity manifested in increased feelings of fatigue (weariness), sleepiness, reduced ability to react, as well as by fluctuations and a steady decline in performance. The state of monotony is most frequently caused by the following working situations: monotonous work, shortage of feedback from the environment, limited viewpoint, repetition, long duration of the work and low degree of challenge.

KINDS OF FATIGUE

There are certain criteria on the basis of which individual kinds of fatigue are distinguished. The basic criteria are as follows:

- the kind of activity inducing fatigue. According to this criterion we can distinguish between physical (muscular) and mental fatigue;
- the consequences of fatigue for the organism. We can distinguish between natural (ordinary) and harmful fatigue;
- the degree of skill required in a given activity. On the basis of this criterion primary and secondary fatigue are distinguished;
- the character of the activity, distinguishing between fatigue after dynamic or static activity;

- external and internal indicators, distinguishing between objective and subjective fatigue;
- the extent to which different parts of the organism are involved in activity. On the basis of this criterion, we distinguish between general (total) and partial (local) fatigue.

Physical and mental fatigue

In the past, various definitions were put forward in order to distinguish between physical and mental fatigue in man. This division had its roots first of all in the history of the development and division of labour. At a certain stage of social development a group of people emerged who worked exclusively on the production of material goods, while another group of people were occupied with the organization and management of the production process or other types of mental activity and did not take an immediate part in the production of goods. Thus were formed a group of 'purely' physical workers as well as a group of 'purely' mental workers. This clear-cut division of people was most expressive especially when the production process requiring human labour started to specialize, when the physical workers in the productive process performed only a specific, limited operation, quite automatically, according to the dictates of a machine. As a consequence of the division of work into 'purely' physical and 'purely' mental activity, the resulting fatigue was conceived as either purely mental or purely physical.

The division of fatigue between physical and mental was also brought about by the lack of uniformity in the theory of fatigue. With physical fatigue the humoral-localistic theory dominated for a long time, suggesting that the cause and mechanism of fatigue was located elsewhere than with changes of activity in the central nervous system, while (if its existence was acknowledged at all) researchers more or less had to agree that the appearance of mental fatigue was connected first of all with changes in higher nervous activity. Thus it happened that people started to look upon physical fatigue as being different from mental fatigue. According to these views, it was the performing muscles that became tired with physical fatigue, while with mental fatigue it was the highest areas of the central nervous system. In this way a gap was formed not only between physical and mental work, but also between physical (muscular) and mental fatigue. Nowadays, the new approaches to mental and physical work, as well as to mental and physical fatigue, have made it clear that the difference between them is really only relative.

The facts that bring these two kinds of fatigue nearer to each other are as follows:

1. The principal role, both in physical (muscular) and mental fatigue, is played by changes of activity in the cells of the central nervous system. The central

direction of muscular and mental activity is illustrated by the fact that, after exhausting muscular activity, efficiency in the sphere of mental activity also decreases, while after intensive and prolonged mental activity muscular efficiency also declines.

2. The mutual relation between muscular and mental fatigue will become clearer when we realize that in man no 'purely' muscular or 'purely' mental fatigue exists. There is no strict border between muscular and mental activity.
3. Similarly, as with muscular activity, mental activity is also reflected in the organism as a whole. Even mental activity, if intensive or prolonged, causes some changes in the metabolism and vegetative processes, though not so evidently as with muscular activity.

However, there are also some facts that demonstrate that both mental and muscular activities — as well as the resulting fatigue — have some specific characteristics that make it possible to talk separately about muscular activity and mental activity, as well as physical and mental fatigue.

What are these characteristics? We shall be able to answer this question more completely after describing human activity in general, particularly from the point of view of the mutual representation of physical and psychical functions and operations.

According to this criterion human activity can be roughly divided into three large groups:

1. The activity most approaching the 'pure' physical operations of the human organism. This activity lays stress primarily on muscular aspects of man, with less emphasis on higher psychical operations.
2. Activities with approximately the same quantity of physical and psychic functions and operations. This activity requires not only thorough theoretical and practical knowledge of the working processes, but also physical efficiency and muscular power at the same time.
3. The activity most closely approaching the so-called 'pure' psychic activity. The workers of this group employ predominantly logical, mental procedures. This group might include first of all scientific workers who discover new laws of nature and society.

As for the division between the physical and mental functions of man, it is necessary to mention that this is a very gross separation and does not completely cover all kinds of human activity. The above groups include many sub-divisions, with various shades of meaning. It is only a theoretical division, broad and basic, displaying great variability in practice.

Now let us return to the question of the relative differences between physical and mental work, as well as the fatigue resulting from them.

The differences between physical and mental work are especially distinguished by the following:

1. Mental work is more closely and immediately connected with the activity of the central nervous system, i.e. with the higher nervous activity of man. Muscular work is also directed by the central nervous system, but into this activity the contribution of a series of other organs and systems is inserted, while with 'purely' mental work there is no such interference, or if there is some, then not to such a high degree. The highest forms of mental activity — like the processes of generalized and mediated cognition — are almost exclusively manifestations of functions of the highest areas of the human brain.
2. Another difference between muscular and psychic activity is represented by the fact that it is impossible to interrupt psychic activity completely, even after its formal cessation, while with physical work this is possible. Manual, muscular activity, even if the task is not completely finished, may be interrupted and no more physical work need be done. Formal interruption of unfinished psychic activity, however, does not in substance bring it to an end; it goes on occupying our thoughts, sometimes to such a degree that, in spite of our greatest efforts, we are unable to release ourselves from it; we are obliged to think of it constantly, and we are frequently even haunted by it in our dreams.
3. Contrary to physical work, mental work is characterized by smaller often negligible participation of the limbs, which is reflected also in various changes of the vegetative organs. Such a change is manifested, for example, in a different blood supply by the veins to peripheral and internal organs during physical or mental activity.

So far we have more or less dealt with the relation between exhausting muscular and psychic activities of the body, their mutual influence, and their common and distinct characteristics, while the substance of mental fatigue itself or fatigue originating after prevailingly mental activity, has not been entirely resolved.

In the field of mental fatigue sufficient scientific data have not yet been accumulated to make it possible to infer basic theories. The specific mechanisms of mental fatigue are not yet known.

What is known, however, is that mental activity takes place at the behest of the central nervous system, reflected to lesser or greater degrees by changes in the periphery of the organism, which do not have any substantial influence on the earlier or later occurrence of mental fatigue.

This means that the analysis of mental fatigue, or more precisely fatigue originating after mental activity, and the clarification of its mechanisms should be based on studies of changes of higher nervous activity and changes in a person's psychic states.

This statement is based on the presumption that the onset of fatigue after mental activity is generally caused by gradual languishing of the so-called 'working dominant' in the highest areas of the central nervous system.

Objective and subjective fatigue

Fatigue originating after exhausting or prolonged activity and manifested by a measurable reduction in the quantity and quality of performance, as well as by changes of function in the body's organs, is called objective fatigue.

The feeling of weariness and exhaustion is called subjective fatigue. Fatigue is often identified with the feeling of weariness or so-called 'tiredness'. Tiredness is considered to be a slighter degree of fatigue, typically a natural symptom of the onset of fatigue.

The problem of tiredness, i.e. the subjective feeling of fatigue, has not so far been especially dealt with by anybody; that is why there is so much confusion connected with it.

Thus, the relation between tiredness and fatigue has not yet been made quite clear. Even though we acknowledge the general statement that the feeling of tiredness is a symptom of the onset of deeper fatigue, still objective fatigue and tiredness are not always parallel. It often happens that tiredness occurs without any direct objective cause. A person may feel tired, but objectively they need not necessarily be tired yet. Sometimes we feel tired immediately after beginning work, especially if that work is not particularly interesting for us or when we have a negative attitude towards it. In other cases, when the work is interesting, varied, pleasant and being carried out with enthusiasm, it may be a long time before we feel tired.

The above facts suggest that there are differences between the curves of efficiency and tiredness. These differences were shown in experiments of V.V. Rozenblat, who investigated the mechanisms of fatigue and rest in static pressures of a finger on a mercury dynamometer.

Fatigue after static and dynamic activity

N.J. Vvedenskij [19] discovered the law of reciprocal innervation which is in force with the dynamic activity of muscles. While one member of a pair of muscles-antagonists (e.g. flexor) performs a movement, the other member (extensor) is in a state of repose, and vice versa. A similar situation arises in respective areas of the central nervous system. When the brain centre for the flexor muscle is in a state of excitation, as if automatically this excitation induces a state of inhibition in the brain centre of the extensor muscle, and vice versa. Therefore it is possible that with dynamic activity, in which the work of the muscles-antagonists alternates (but especially in the central nervous system where the process of excitation alternates with the process of relaxation), conditions are created for a partial restitution of the reduced efficiency of brain cells. This means that the respective brain cells of the motor area of the central nervous system (CNS) in a state of inhibition have time to recover and cor-

pensate for the losses of energetic and nutritious substances expended during the state of excitation. This is a kind of alternation of the processes of exhaustion and recovery of respective brain cells in the motor area. In muscular activity like this, provided it is not too intensive, the onset of fatigue is delayed, since the process of restitution manages to keep pace with the process of exhaustion.

With static activity the situation is quite different. While in dynamic activity there is a constant alternation of action between muscles-antagonists, but principally in the respective nerve centres which are in reciprocal relationship, with static activity the relatively long-lasting use of the same muscles, but principally the same groups of CNS cells, leads to the faster onset of fatigue. It may be said then that static muscular activity makes a person tired much more rapidly and more profoundly than dynamic activity. Even everyday experience is enough to convince us that static activity is much more exhausting than dynamic activity. For example, anybody would more easily endure two hours of walking than two hours of standing still (soldiers used to be punished by being kept standing to attention for a long time, or pupils by having to hold their hands stretched out).

The cause of the rapid onset of profound fatigue with static muscular activity lies in the fact that there is a constant stream of nervous impulses flowing from nerve end-plates of the muscles concerned into the respective areas of the central nervous system and, conversely, there is a constant transmission of impulses from the respective areas of the central nervous system to the working muscles. The respective cells of the central nervous system have no time to recover and quickly become exhausted.

The above statements on fatigue and static and dynamic muscular activity are to a considerable degree equally valid in the case of fatigue induced by static and dynamic mental activity. After static, monotonous and uniform mental activity fatigue arises much sooner and is much more profound than in the case of dynamic, heterogenous and changeable activity. The difference between fatigue after static muscular and static mental activity lies especially in the fact that the nervous impulses from cortex cells of the central nervous system do not go to the peripheral working organs, but are mainly confined to the central nervous system.

Both when mental or muscular activity dominate, from the point of view of neuropsychic load, work is more difficult and tiresome when only a limited anatomic area of directing and co-ordinating cells of the central nervous system is involved and, conversely, efficiency can be maintained for a longer time and more successfully when larger areas of the central nervous system are involved in a person's activity.

Ordinary and harmful (chronic) fatigue

The division between ordinary and harmful or chronic fatigue is based on its consequential effect upon the organism.

Fatigue arises as a consequence of prolonged or intensive activity of the organism. One of the characteristics of ordinary fatigue is that, under normal circumstances, the human organism recovers from it.

So we can say that, if fatigue is of such a degree that daily rest (but especially a night's sleep) is sufficient for full recovery and total restoration of the body's forces for further activity, then we are talking about ordinary fatigue. Ordinary fatigue, resulting from one day's activity, does not usually lead to reduced efficiency for the following day. This means that in the morning the level of efficiency is approximately the same as it was on the morning of the previous day. Fatigue of this kind is not harmful, since the organism is able to recover from it naturally from day to day.

However, there may arise situations when the demands laid on the organism by the environment are so high that it cannot cope with them. When this state is repeated several times, day after day, a person's efficiency gradually decreases, which is a symptom of harmful or chronic fatigue. If the fatigue accumulated in the course of a day is not eliminated in one way or other, a state of chronic fatigue may arise.

Chronic fatigue arises as a consequence of over-exertion or over-burdening of the body.

From a practical point of view it should be stated that chronic fatigue arises most frequently when a person has performed over a long period of time a monotonous, static activity, employing a small area of the central nervous system and a small group of nerve cells. As a consequence of constant activity, and constant excitation of the same nerve cells (without alternation of activities with other CNS cells), these cells cannot be fully restored or regenerated. Chronic fatigue may reach the stage when a person is unable — in spite of all exertions — to continue successfully in the activity and, therefore, in the interest of health and further efficiency, it becomes inevitable to interrupt that activity.

Primary and secondary fatigue

According to the degree of adaptation of the organism and all its systems to a certain activity, under the guidance of the central nervous system, we can distinguish between primary and secondary fatigue. From the practical point of view the basic criterion of this distinction forms the degree of man's skill in a certain activity.

Primary fatigue occurs when a person has not acquired enough practice (and training) in a certain activity and secondary fatigue arises when someone does

have enough practice in an activity but, from the point of view of the organism's load, that activity is either too exacting or long-lasting. Primary fatigue arises much sooner after the start of an activity than secondary fatigue.

The mechanisms of primary and secondary fatigue are in substance identical. Nevertheless, there are also some differences. The difference between these mechanisms is indicated first of all by the fact that the rapid and marked inhibitory blockade of the central part of the movement analyser is characteristic of primary fatigue.

With secondary fatigue the expressive changes in the organism, but especially the processes of inhibition of the central nervous system, appear more slowly and are delayed. With this kind of fatigue regular, harmonic metabolism may be observed.

The processes of restitution after primary fatigue also differ from the processes of restitution after secondary fatigue. After primary fatigue they are much faster, while with secondary fatigue the course of restitution is much slower.

The differences in the basic components of primary and secondary fatigue follow first of all from the operation of the body's adaptation mechanism in connection with certain working activities. With secondary fatigue the point is the gradual adaptation of all systems of the organism in their complex mutual co-operation, under the leading role of the most sensitive system — the central nervous system. The organism's adaptation to working activity takes place as a result of the organism's reconstruction and improvement of the trophic function of the vegetative system, under the control of the central nervous system.

When the human body has adapted to a certain activity it is more fatigue resistant and therefore the onset of fatigue takes place much later than in the case of non-adaptation or insufficient adaptation. Gradual adaptation of the organism to a certain activity takes place through the acquirement of practice.

However, we must be aware that even good efficiency does not have an unlimited duration. Gradually secondary fatigue develops together with a reduction in efficiency, though not as rapidly as with primary fatigue.

Local and total fatigue

Fatigue concerning individual parts of the body (e.g. fatigue of the eyes after a long period of reading or in feeble lighting) is called local fatigue. Fatigue affecting all organs and systems of the body (e.g. after very exhausting and prolonged mental activity) is called total fatigue.

Local fatigue arises when just one organ has been active for a long time. In such a case there is a constant flow of excitation from the operating organ into

respective centres of the central nervous system and vice versa — a flow of impulsation from the CNS to the organ. When the excitation and impulsation last a long time, gradual onset of the state of fatigue in respective areas of the central nervous system is induced. In such a case fatigue is localized only to respective regulating areas of the central nervous system.

On the contrary, total or general fatigue arises when there are more organs and systems of the body taking part in exhausting or intensive activity. In such a case there is a greater quantity of excitation from the operating organs going to the central nervous system, to its various centres and areas. These centres, meanwhile, transmit impulses for the performance of the activity to the respective performing organs. When the impulses as well as the excitation have been frequent and strong, a gradual onset of the process of fatigue appears in the concerned centres of the central nervous system, namely total fatigue. The term total or general fatigue is used since the fatigue attacks the prevailing part of the CNS centres and areas. However, generalized fatigue may result, as is often the case, from local fatigue as well. When the activity of a certain performing organ has gone on for too long or too intensively, or when the impulses and excitation are too frequent and too strong, fatigue starts to spread from the original centre or area to other sections of the central nervous system.

In conclusion, it is necessary to state that the performance of pupils and teachers, particularly their psychic activity, is affected by other psychic phenomena besides fatigue.

THE PERFORMANCE OF PUPILS AND TEACHERS IN THE EDUCATIONAL PROCESS

The more effective the educational interaction and communication between teacher and pupils, the more effective education and instruction become. However, active collaboration requires certain environmental conditions to be respected both for the teacher and the pupils. If instruction is to be successful as a bi-polar process it must be carried out by pupils and teachers under optimal working conditions. The teaching activity of the teacher and the learning activity of the pupils, both in school and out of school, are very demanding on mental functions. If these activities last a long time, sooner or later they lead to fatigue, which in one way or another has a negative influence on the efficiency of teachers and pupils.

The author of this monograph investigated the state of efficiency of pupils and teachers in the educational process over thirteen years. The following section will provide a brief summary of the data obtained on:

1. The pupils' workload in and outside the school;
2. The teachers' workload in and outside the school.

The pupils' workload in and outside the school

From the point of view of educational, school and teacher psychologies, the purposeful, planned and systematic instructional activity of the teacher represents a developing action. This means that every correct educational action of the teacher aims at the development of the pupil's whole psyche and personality.

The body of a schoolchild is going through a stage of intensive growth, therefore the child should not be burdened to the same extent as an adult who is no longer growing and can direct all his energy to work. The child can devote to learning activity only a part of the intellectual and physical forces, since a great part of them must be diverted to growth and development of the organism. If the school and the pupil's surrounding environment expect too much and the forces necessary for healthy physical and mental development become exhausted, then sooner or later an overcharge will occur with unfavourable consequences for both the pupil's intellectual development as well as the overall state of health.

Excessive and frequent over-burdening of pupils may lead to so-called chronic fatigue resulting in illness and deficiencies, such as mental retardation, juvenile hypertonia, various personality disturbances, etc.

On the other hand, when the pupils are not appropriately challenged with tasks, their mental development is hindered.

Reasons for over-burdening pupils

In recent decades the voices of experts and laymen have been heard raised against the over-burdening of pupils. Opposition may only be successful when the reasons for over-burdening are known. The reasons are numerous and they may be divided them into two groups:

1. *School reasons* include first of all: a great number of lessons each week; the quantity and difficulty of the subject-matter; inappropriate quantities of homework and incorrect scheduling during the week; shift classes; a large number of pupils in the class; clumsy timetabling, etc.
2. *Out-of-school reasons* include especially: overestimation of the physical and mental abilities and possibilities of pupils by their parents; their excessive involvement in household tasks; the time taken up on the way to and from school; inadequate organization of the family's daily routine; the number of private lessons; etc.

Reasons for over-burdening pupils in school

There are many reasons why pupils are over-burdened at school, but we shall concentrate on just two of them: the time taken up by homework; and the influence of two-shift alternating instruction.

As far as the time taken up by homework is concerned, we undertook to find out the actual state of affairs by means of a questionnaire given to pupils from thirteen schools in towns and villages from various regions of Slovakia. In the questionnaire we attempted to ascertain, among other things, the average quantity of time per day spent on the preparation of homework by pupils in individual forms of the primary school. Responses were obtained from 1,871 pupils.

At the time this research was conducted and the results published in Czechoslovak specialized journals, nine-year elementary school was divided into Grade I — forms 1 to 5, and Grade II, forms 5 to 8.

With pupils in the first and second forms the questions were answered by their parents or teachers in children's centres attached to the schools. The questionnaire data were compared with the norms determined for the pupils of individual forms by educators, psychologist and school medical services in the USSR, under the leadership of M.N. Antropova [20].

Time norms for the preparation of homework by pupils in individual forms were: 1st form, 1 hour; 2nd form, 1½ hours; 3rd—4th forms, 1½—2 hours; 5th—6th forms, 2 hours; 7th form, 2½—3 hours; 8th—9th forms, 3 hours. These norms are very time consuming.

Comparing our data with the above norms in individual forms, starting with the second form, produced the following results:

— *In the second form*, out of 85 pupils questioned, 23 were appropriately burdened by homework (i.e. approximately 27.3%); 8 pupils were over-burdened (9.4%); and 54 were insufficiently burdened (63.4%).
— *In the third form* of 150 pupils, 66 were appropriately burdened (44%); 26 were over-burdened; (17.3%); and 58 were insufficiently burdened (38.7%).
— *In the fourth form* of 283 pupils, 125 were appropriately burdened (44.2%); 55 were over-burdened (19.4%); and 103 were insufficiently burdened (36.4%).
— *In the fifth form* of 265 pupils, 105 were appropriately burdened (39.7%); 41 over-burdened (15.5%); and 119 insufficiently burdened (44.8%).
— *In the sixth form* of 235 pupils, 77 were appropriately burdened (32.7%); 71 were over-burdened (30.2%); and 87 insufficiently burdened (37%).
— *In the seventh form* of 216 pupils, 41 were appropriately burdened (19%); 12 were over-burdened (5.5%), and as many as 163 were insufficiently burdened (75.5%).
— *In the eighth form* of 320 pupils, 94 were appropriately burdened (30%); 0.3% were over-burdened; and 225 pupils (70%) were insufficiently burdened.

The first and ninth forms were not evaluated.

The summary evaluation of the pupils' workload from the point of view of the time required by an average daily preparation of homework in the second to the eighth forms of the primary school was as follows: 33.9% of investigated pupils were appropriately burdened; 13.9% were over-burdened; and 52.2% were insufficiently burdened.

As for the pupils from the second to the fifth forms, of the total number of questioned pupils, 38.8% were appropriately burdened, 15.4% over-burdened, and 45.8% insufficiently burdened.

With pupils from the sixth up to the eighth forms, 27.2% were appropriately burdened, 12% were overburdened and 60.8% were insufficiently burdened.

The above data may provoke the observation that the time norms for the preparation of homework in individual forms are already too high and merely respecting these norms, in addition to the large number of lessons at school, would inevitably overburden the pupils. This objection may have some justification. However, this question should undergo further research. Let us admit that the above time norms are quite severe. But when we have a closer look at the number of pupils in the second up to the eighth forms who do *not* spend an average of more than one hour daily on the preparation of homework, we can see that out of 1,554 pupils there were 624 of them, i.e. something over 40%. And one hour per day spent on homework was in no case an exaggerated requirement.

These gross data, which have not been analysed in detail and therefore only serve to orient our discussion, suggest that about 40% of investigated pupils were not sufficiently burdened with homework. As has already been mentioned, both over-burdening as well as insufficient burdening of pupils lead to negative consequences, especially as far as the development of the functional efficiency of their psyche is concerned.

Another serious reason for over-burdening pupils in school is represented by the two-shift instruction system.

Instruction in two shifts lays greater demands on pupils than the normal one-shift forenoon period. In the afternoon shift the pupils work under considerable unfavourable physical, physiological and psychic conditions compared with the forenoon classes. The unfavourable conditions during the second shift lead to over-burdening of the pupils.

There are still many primary schools, especially in towns, with two-shift instruction alternating by weeks, i.e. one week the pupils attend school in the morning and the next week in the afternoon.

Furthermore, this unfavourable situation was further complicated by the introduction of a five-day school week. As a consequence, the number of lessons on individual days increased, with a particularly bad effect on pupils in the afternoon shifts.

Some years ago the two-shift instruction system concerned over half the pupils in Czechoslovak primary schools. It was then decided to undertake a thorough investigation of the state of efficiency of pupils in the afternoon shift and to compare the data obained with the state of efficiency of pupils in the forenoon shift.

Three methods were adopted to investigate pupils' efficiency. The aim was to compare the results of individual methods and to verify the findings.

The first method used to ascertain the level of pupils' attention in both shifts of instruction was that of asking the pupils to carry out simple arithmetic additions.

The second method ascertained the state of mechanical memory of pupils after individual lessons of forenoon and afternoon instruction.

The third method ascertained the state of pupils' mental capacities. They were required to multiply two-digit numbers. The investigation lasted (besides a training period) for six weeks, three weeks for the forenoon period and three weeks for the afternoon period, involving pupils every day before classes and after each individual lesson.

All three methods were applied to the same class (the seventh form), with the same pupils following the same timetable. Altogether 252 measurements were made (126 with the forenoon and 126 with the afternoon shift).

In evaluating the results of individual investigations, both the quantity and quality of pupils' performances were recorded.

In the following section, the results of the investigation in the form of pecentages of pupils' net performances, obtained by individual methods in both shifts of instruction, in weekly averages, will be discussed.

Figure 8 shows the weekly averages of the results obtained by the first method in both shifts of instruction, before classes and after each individual lesson. The graphic representation indicates that in the forenoon period the pupils manifested their best efficiency before classes began and after the first two lessons. Then, due to the onset of fatigue, efficiency started to decline. Efficiency was lowest after the fifth lesson of instruction.

The results obtained from the afternoon period differed. It is immediately evident from the diagram that before classes and after individual lessons (with the exception of the fifth lesson) the results were worse than with the forenoon shift. In the afternoon shift the best results were achieved before instruction and after the first lesson; afterwards efficiency constantly declined until the end of instruction.

The above results suggest that the state of pupils' attention, measured by the method of simple addition of numbers before instruction and after each lesson, is better in the forenoon shift compared with their states of attention in the afternoon shift.

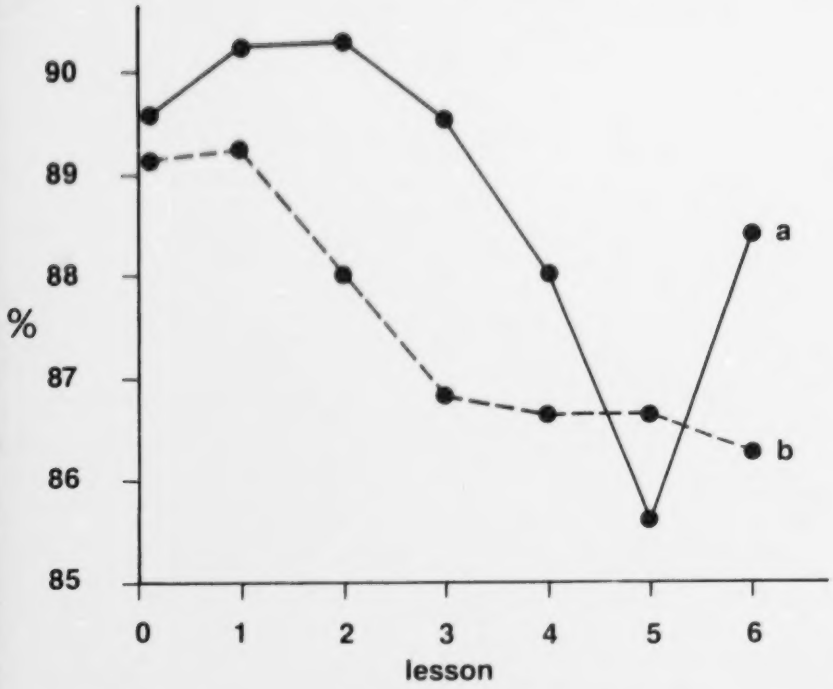

FIGURE 8. Pupils' weekly average performance in the simple addition test: (a) in the morning shift; (b) in the afternoon shift.

The weekly average of the state of efficiency of pupils, measured by the method for ascertaining mechanical memory after individual lessons in both shifts is shown in Figure 9.

The figure shows that, on average, the best efficiency in mechanical remembering of numbers was manifested by pupils in the forenoon shift after the third lesson. Taking the weekly averages of efficiency after the first and second lessons of this shift, there was almost no difference (only 0.02%). After the third lesson the average weekly efficiency of pupils started to decline rapidly. This decrease in efficiency was greatest after the fifth lesson when the pupils were already unable to form the associations between the cues of sound stimuli of the read numbers with the same speed and precision. This was the influence of the onset of fatigue, which reduces the quick and precise formation of associations.

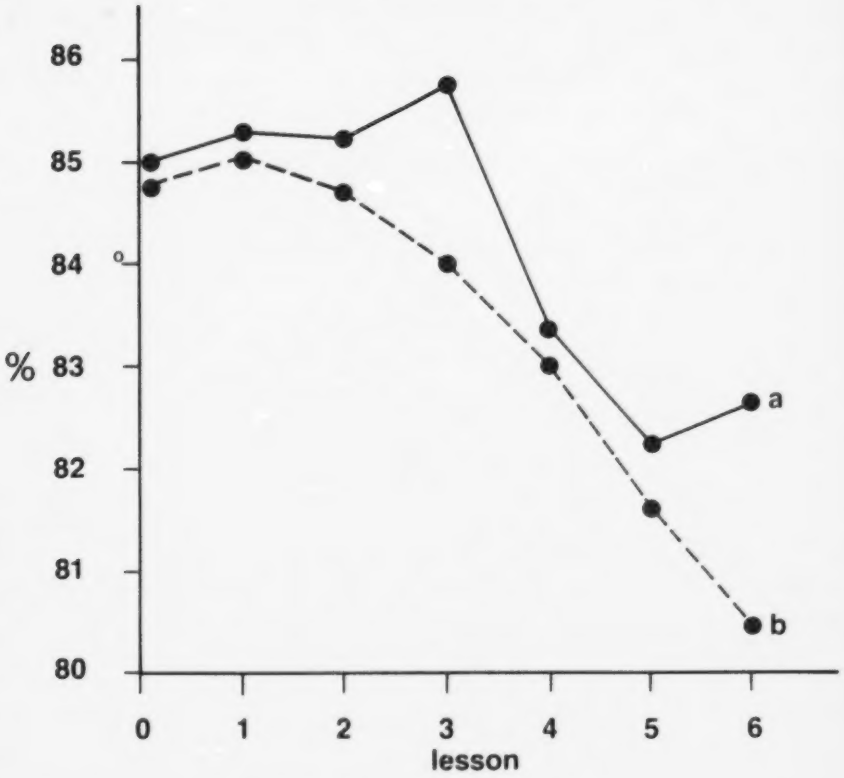

FIGURE 9. Pupils' weekly average performance in a mechanical memory test: (a) in the morning shift; (b) in the afternoon shift.

As the diagram shows (broken line), in the afternoon shift the best average efficiency was achieved with this method after the first lesson. Starting with the second lesson, efficiency started to decline.

The diagram further shows that total performances (with the exception of the first lesson) were better in the forenoon period.

The state of pupils' efficiency measured by the method of oral multiplication, after individual lessons in both shifts, is shown in Figure 10.

The figure shows the state of efficiency of the pupils in the domain of thought processes before instruction and after individual lessons, both in the forenoon and afternoon shifts.

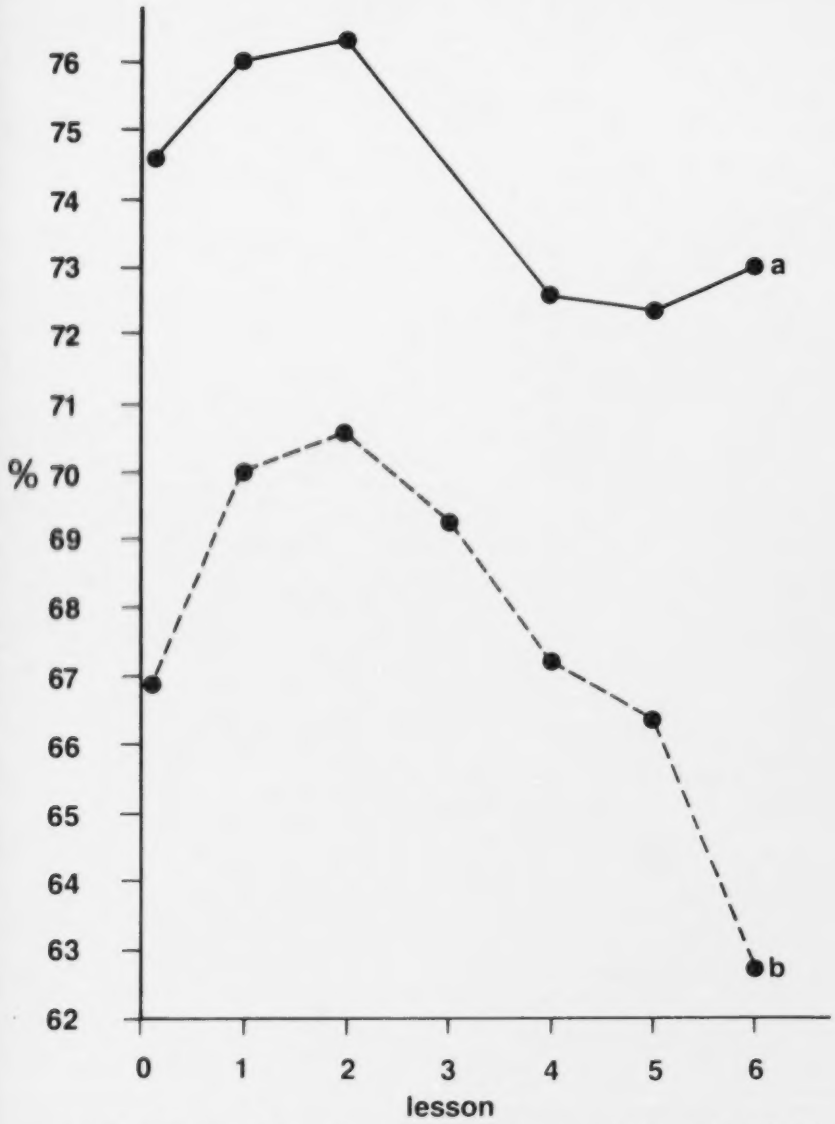

FIGURE 10. Pupils' performance in an oral multiplication test: (a) in the morning shift; (b) in the afternoon shift.

These measurements indicated the greatest differences in pupils' performances between the two shifts of instruction. This may be explained by the fact that these measurements were to ascertain the state of thought processes, i.e. the most complex, most delicate processes, reacting most sensitively to fatigue. Since pupils in the afternoon shifts were already tired after the whole morning's activity, fatigue also had a negative influence on their state of efficiency in the field of thinking, the highest cognitive process.

To conclude this gross analysis of the research results, we shall introduce a percentage survey of average performances obtained by all three methods, as represented in Figure 11. The diagram makes it possible to compare the state of investigated pupils in both shifts.

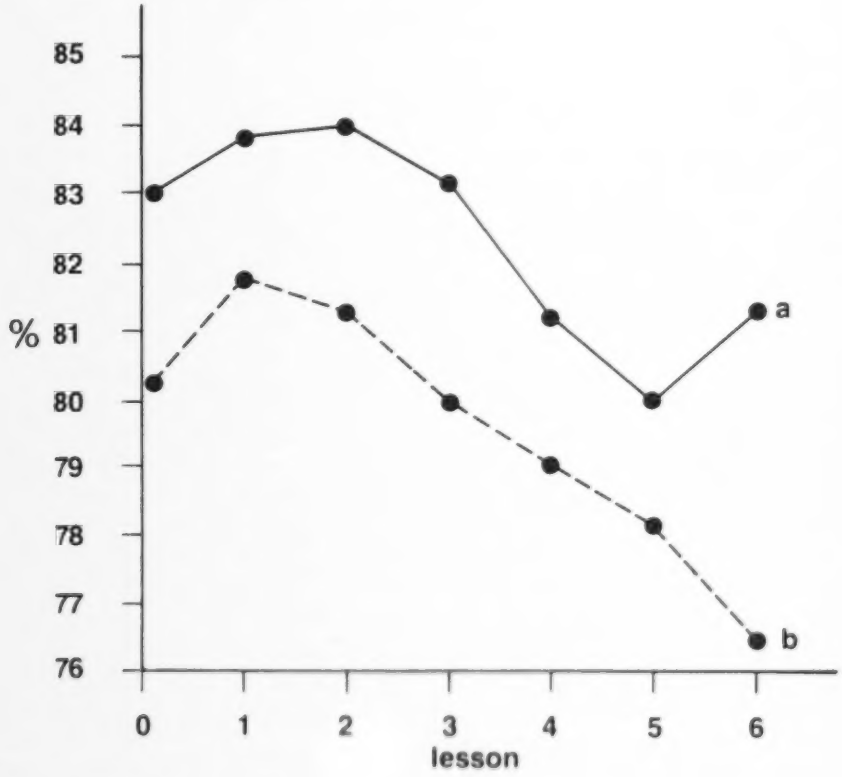

FIGURE 11. Average total results of pupils' performances: (a) in the morning shift; (b) in the afternoon shift.

In fact, the curves of the diagram represent the averages of weekly average data obtained by all methods.

On the basis of a brief analysis of this summary diagram it was possible to ascertain the following facts:

1. The total state of efficiency of pupils in the investigated groups was in general better in the forenoon that in the afternoon.
2. In the forenoon, the best efficiency was manifested in the first two or three lessons, and the worst at the end of the fifth lesson, while in the afternoon, with exactly the same timetable, the efficiency of the same pupils was best after the first lesson and worst at the end of instruction. There was a difference caused by the fact that in the morning the pupils came to school after a beneficial night's sleep, while in the afternoon they had already undergone some mental activity, having learned and prepared their homework during the morning. Therefore, their resistance to fatigue was no longer so great. In the afternoon shifts even the environmental conditions were worse than in the morning.

In our forenoon measurements, the pupils manifested better efficiency after the sixth, i.e. the last, lesson than after the fifth. This phenomenon did not occur in the afternoon classes. Its occurrence may be explained first of all by psychological reasons. It represents the joy of completing the whole day's activity and the expectation of leisure. These pyschic states may mobilize the reserves of psychic forces in human beings at the end of activity and thus raise performance levels. It is a kind of finishing flourish, well-known with sportsmen too. However, this improvement is possible only when there is a certain reserve of psychic force. This is the case with pupils in the forenoon shift while, after a whole day's intensive activity (preparation of homework in the morning and six lessons of instruction in the afternoon, and under much less favourable environmental conditions), and under the influence of fatigue, the joy of completing school work is unable to trigger the depleted reserves of psychic force for a final flourish in the afternoon shift.

Reasons for over-burdening pupils outside the school

The reasons for over-burdening pupils with out-of-school activities should be looked for in household duties, travel to and from the school and in private lessons.

Over-burdening pupils with household duties is not nowadays as important as it used to be in the past. It is mainly the pupils of poor parents who are concerned. Older teachers can still remember the times when many children (especially in villages) either stopped coming to school with the onset of spring or towards the end of the autumn, or came unprepared for the classes, simply because they had 'to help their parents'.

By means of a questionnaire we found out how much time a week primary pupils devoted to household chores. We received questionnaires from 845 pupils in the first level of the primary school (1st to 5th forms) and 875 pupils at the second level (6th to 9th forms). The results showed that out of the 845 pupils in the first level of primary school, 647 (approximately 76%) were helping in the household up to 10 hours per week and 198 pupils (approximately 24%) more than 10 hours a week. However, 44 pupils in the above number were not helping their parents at all.

As for the second grade of the elementary school, 9 pupils (approximately 1%) out of 875 were not helping their parents at all, 96 pupils (11%) were helping for 5 hours a week, 258 pupils (over 28%) were helping for 5 to 10 hours, 325 pupils (over 37%) from 10 to 15 hours, 152 pupils (over 17%) from 15 to 18 hours, and 35 pupils (approximately 4%) were helping 18 hours and more per week with household chores. The above data indicate that even at the time of our survey there were still families involving their children in a lot of household chores.

Over-burdening pupils during travel to and from the school is also gradually disappearing. New schools have been built closer to population centres, as well as the establishment of new bus and train connections, adjusted to the pupils' timetables. The data obtained by means of a questionnaire indicate that, out of the total number of 2,054 primary school pupils, 550 (27%) needed 0 to 10 minutes a day to get to and from the school, 567 pupils (over 27%) needed 10 to 20 minutes, 440 pupils (over 22%) 20 to 30 minutes, 224 pupils (over 10%) 30 to 40 minutes, 177 pupils (over 8%) 40 to 60 minutes, 85 pupils (approximately 4%) 60 to 90 minutes, and 11 pupils (approximately 0.5%) over 90 minutes. The data suggest that at the time of our investigation only 96 pupils out of the total number of primary school pupils investigated spent more than one hour a day travelling to and from school, representing about 4.6%, so that the vast majority of our pupils were not over-burdened in this respect.

Over-burdening of pupils by out-of-school lessons was also ascertained by means of a questionnaire. The data obtained indicate that a large number of pupils attended out-of-school lessons (foreign languages, music, ballet, figure-skating, etc.), namely 459 (i.e. over 22%) out of 2,030 pupils questioned. Of these pupils, 337 spent more than three hours a week on private lessons, but it was quite alarming that 140 pupils spent seven hours a week or even more on out-of-school lessons and in preparation for them.

In general, the endeavour by parents to provide their children with more than is provided by the school should be evaluated positively. However, parents often make a mistake by overestimating the capacities of their children. The pupils who are forced to undertake further learning, not always appropriate to them, are robbed of the leisure time that would have enabled them to rest and restore their strength, and even of their opportunity to play. These children

often watch with envy their friends playing outside, while they must learn foreign words or grammar, or practise musical instruments. This does not mean, of course, that we would disagree with pupils attending extra-curricular classes or courses. The point is that the pupils should not be over-burdened with them; they should attend them after consultation with the class teacher, so that parents do not do more harm than good to their children.

The teachers workload in and outside the school

The teacher's activity in and outside the school is very demanding. It lays great requirements on psychic activity, especially during instruction, but also in preparation for instruction, in correcting the pupils' work, as well as in public functions. The teacher's work is predominantly psychic, since it requires paying attention over lengthy periods, perception, memory, thinking and other psychic functions. All these functions, the inevitable activity of the educational process, may be effective only when the teacher is in a good psychic state. The psychic state of human beings, including teachers, forms the foundation determining the level and effectiveness of their psychic functions. The psychic state, reflecting the actual level of functional efficiency of the teacher's psyche, depends on many factors. One of the basic factors influencing the teacher's intellectual state is represented by the level of the work load, both as regards quantity and quality.

In this section we shall deal only with the quantitative (time) load of teachers. Many teachers constantly complain that they are over-burdened by formal and out-of-school activities. Our investigation (by means of a questionnaire and a field experiment) set out to ascertain if this was indeed the case.

Reasons for over-burdening teachers

Schools in Czechoslovakia are divided into fully organized (or complete) schools and not fully organized (or incomplete) schools. In fully organized schools there is a separate class for each successive year; in not fully organized schools children from different years may be grouped together in one class. In the past incomplete schools were quite common, whereas now they constitute the exception.

From among the many reasons for over-burdening teachers in and outside the school we have chosen the following ones: the number of surplus lessons; the two-shift instruction system; and the number of hours spent at home working on school and out-of-school activities.

One of the reasons for over-burdening teachers in the school is the excessive teaching load, especially during the first grade of incomplete primary schools. By means of a questionnaire we attempted to find out what was the actual

number of lessons taught by teachers per week. The number of teachers from various towns and villages of Slovakia who returned their questionnaires was 1,627 (1st grade: 913, 2nd grade: 714). At the time of investigation the prescribed weekly teaching load at the first grade (1st to 5th forms) was 26 lessons, and at the second grade (6th to 9th forms) 24 lessons.

The questionnaire data for the first-grade primary school-teachers were analysed separately for incomplete and complete schools. The data obtained indicated that:

- in one-class schools, out of 79 teachers, 74 were exceeding the prescribed teaching load, i.e. 93.7%.
- in two—class schools, out of 141 teachers, 50 were exceeding the prescribed teaching load, i.e. 35.5%.
- in three-class schools, out of 76 teachers, 34 were exceeding the prescribed teaching load, i.e. 44.6%.
- in four-class schools, out of 39 teachers, 13 were teaching more than the norm prescribed, i.e. 33.3%.

In the first grade of complete primary schools in villages, 40 teachers out of 397 were exceeding the weekly teaching load, i.e. 10.2%, while in fully organized schools in towns only 4 teachers out of 181 were teaching more than 26 lessons, i.e. approximately 2%.

The above data suggest that the prescribed weekly number of lessons was particularly exceeded by teachers in one-class schools and least of all in complete urban schools. This means that teachers of one-class schools were the most over-burdened in their use of time.

As for the second grade of primary schools, we received questionnaires from 714 teachers, 255 from urban schools and 459 from rural schools.

The evaluation and statistical analysis of the data showed that, out of 714 teachers, 77 were teaching 22 lessons per week (10.8%), 2 teachers (0.3%) were teaching 23 lessons, and 74 teachers (10.4%) were teaching 24 lessons. Only 153 teachers out of the total number of respondents were teaching fewer or as many lessons as were prescribed by the former teaching load norms for teachers of the second grade. This represents 21.4% of the total number of teachers investigated. The other teachers (561 = 78.6%) were exceeding this weekly teaching load. A considerable number of teachers were teaching 30 or more lessons a week; altogether there were 81 of them (11.3%).

Another reason for over-burdening teachers in school is represented by the *two-shift instruction system.* This lays much greater requirements on teachers than one-shift forenoon instruction, since in the afternoon they work under more unfavourable physical, physiological and psychic conditions.

The aim of our research was to compare the performances of the same teachers in the forenoon and afternoon shifts of instruction. For this purpose we used Bourdon's test, substantially modified [21].

The teachers were divided into two groups. The first group was formed by the teachers who were teaching in the morning and the second group by those teaching in the afternoon. The investigation was carried out over two weeks. In the second week the groups were exchanged – the first group taught in the afternoon and the second in the morning.

Every day the subjects in both shifts were given the same tasks before classes and after each lesson; this was a guarantee of constancy for the tests in both shifts.

As with the pupils, we also investigated the efficiency of teachers after individual lessons and before the forenoon and afternoon instruction period. The results are shown as a diagram in Figure 12.

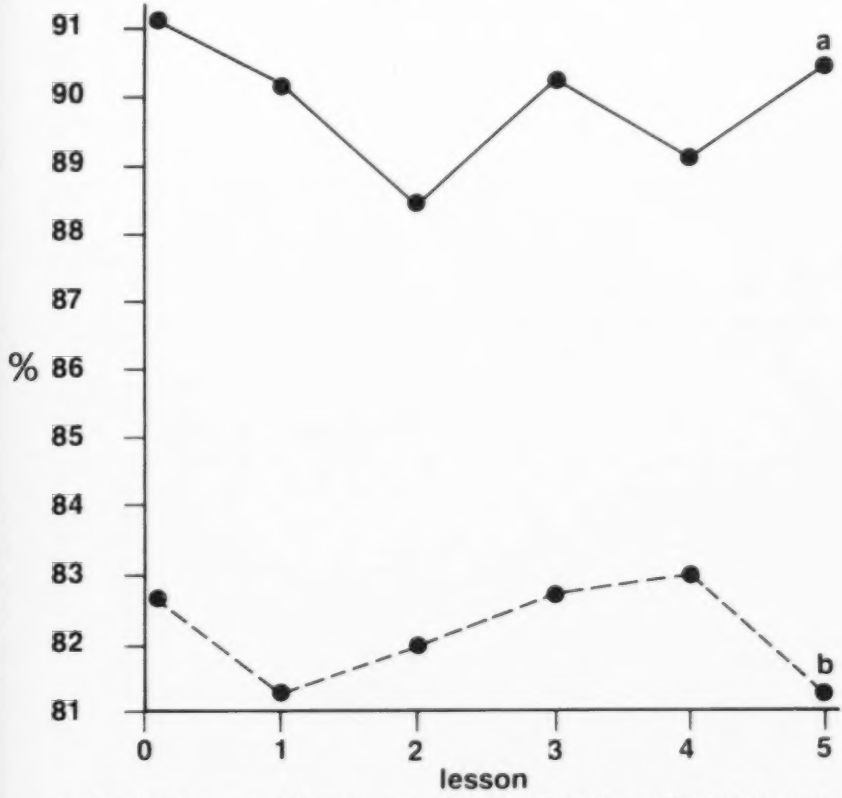

FIGURE 12. Average weekly performance of teachers: (a) in the morning shift; (b) in the afternoon shift.

The diagram clearly indicates a higher level of efficiency in the forenoon shift in comparison with the results in the afternoon shift (for a detailed description of the research method and an analysis of the results see the monograph by L. Ďurič [22]).

The lower level of efficiency in afternoon shifts was caused by fatigue following a whole day's activity and, as a result, instruction in the afternoon could not be as effective as it was in the morning.

Reasons for over-burdening teachers outside the school

At meetings and conferences teachers often complain of being over-burdened by various out of-school activities. To find out to what extent these complaints were justified, our questionnaire also sought information on this topic. The teachers had to state separately: the number of hours devoted to preparing lessons; to correcting written assignments or other work by pupils; to participating in out-of-school activity with children; to other educational activities; to public political and cultural activity; or to extra-mural studies if studying for higher qualifications. The data were given in weekly averages.

The data introduced in this part represent the total numbers of hours devoted to out-of-school activities in general per week.

The data were analysed separately for primary school-teachers of the first and second grades. As for the first grade, the data from teachers of complete and incomplete schools were introduced separately. The data showed that teachers who spent more than 30 hours per week on out-of-school activities were as follows:

- in one-class schools, 30.4% out of 79 teachers;
- in two-class schools, 38.3% out of 141 teachers;
- in three-class schools, 34.2% out of 76 teachers;
- in four-class schools, 33.3% out of 39 teachers;
- in complete rural schools, 29.6% out of 397 teachers; and in towns 30.3% out of 181 teachers.

This means that the smallest percentage of teachers working 48 hours and less was found among one-class teachers and the greatest number among teachers in complete schools.

As for the second grade of primary schools, the results were as follows: of the total number of 714 teachers, 47.2% devoted 30 hours or more a week to out-of-school activities; 25.7 per cent less than 48 hours a week to formal and out-of-school activities; the others were working more than 48 hours.

In conclusion, it should be stated that there are numerous reasons for over-burdening pupils and teachers. However, we have concentrated our attention only on the most important ones that were, at the time of our investigation, principally responsible for over-burdening teachers and pupils.

NOTES AND REFERENCES

1. Woodworth, R; Schlosberg, H. *Experimentálna psychológia* [Experimental psychology] Bratislava, SAV, 1959, p. 845.
2. Vvedenskij, N.J. *Vzruch, útlm a narkóza [Excitation, inhibition and narcosis] Bratislava, SPN, 1953, p. 320.*
3. Gulak, P.Z. *Moločnaja kislota krovi pri predelnoj myšečnoj rabote* [Lactic acid in blood with varied muscular activity] Moskva, Trudy, Gcullek, 1947, p. 3.
4. Jakovlev, N.N. *Očerky po biohemii sporta* [Outline of the biochemistry of sport] 1945, p. 77.
5. Sečenov, I.M. *Izbrannie trudy* [Selected works] Moskva, Nauka, 1961.
6. Engelsmann, F. *Hygiena a organizace duševní práce* [Hygiene and organization of mental work] Praha, 1962, p. 13.
7. Riedl, L. *Únava a její léčení* [Fatigue and its treatment] Železný brod, 1945.
8. Sečenov, I.M. *Válogatott müvei* [Selected works] Budapest, Académia, 1935, p. 162.
9. Pavlov, I.P. *Polnoe sobranie trudov* [Complete collection of works] Moskva, 1951.
10. Rozenblat, V.V. *Problema utomlenija* [The problem of fatique] Moskva, 1961, p. 360.
11. Ďurič, L. *Práceschopnosť žiakov pri dvojsmennom striedavom vyučovaní* [Working efficiency of pupils in two-shift alternating instruction] Bratislava, SPN, 1960.
12. Ďurič, L. *Práceschopnosť žiakov vo vyučovacom procese* [Working efficiency of pupils during the process of instruction] Bratislava, SPN, 1965.
13. Ďurič, L. *Výkonnosť žiakov vo vyučovacom procese* [Efficiency of pupils in the process of instruction] Bratislava, SPN, 1975, p. 24.
14. Sedlák, J. *Pracovní únava* [Working fatigue] Praha, Akadémia, 1981.
15. Rozenblat, V.V. *Problema utomlenija* [Problem of fatigue] Moskva, 1961, p. 72.
16. Ďurič, L. *Výkonnosť žiakov vo vyučovacom procese* [Efficiency of pupils in the process of instruction] Bratislava, SPN, 1975, p. 110-145.
17. Schmidke, H. *Die Ermüdung* [Fatigue] Bern, H. Huber Verlag, 1965, p. 147 et seq.
18. Gubser, A. *Monotonie im Industriebetrieb* [Monotony in industry] Bern, H. Huber Verlag, 1968.
19. Vvedenskij, N.J., op. cit.
20. Antropova, M.N., et al. *Hygiena polytechnického vyučování žáků střední školy* [Hygiene of polytechnical classes of secondary school pupils] Praha, SPN, 1960.
21. Ďurič, L. *Výkonnosť a únava učiteľov vo vyučovacom procese* [Efficiency and fatigue of teachers in the educational process] Bratislava, SPN, 1969, p. 193.
22. Ibid.

CHAPTER SIX

The place of psychology in the Czechoslovak education system

A CONCISE DESCRIPTION OF THE CZECHOSLOVAK EDUCATION SYSTEM

Since the Liberation of Czechoslovakia in 1945, the Czechoslovak education system has undergone substantial changes. The Act on the Uniform School (the Act on Regulation of a Uniform School System, No. 95 of the Law Code) adopted after the victory of the working people in 1948, formed the basis for a profound and universal process of democratization in the school system, education and upbringing.

The school system, education and upbringing became an inseparable part of revolutionary transformation during the construction of the new socialist society.

The democratic principles of the Czechoslovak education system reside in the fact that equality of opportunity of access to education is guaranteed, irrespective of social background, sex, nationality and religious denomination. The content of education and upbringing is based upon the scientific Marxist-Leninist oulook. It draws on the latest knowledge of science as well as on progressive cultural traditions of the nations of Czechoslovakia and the world. Education and upbringing are closely connected with people's life and work. A polytechnical and work-oriented principle is enforced in schools at all levels.

The principle of uniformity in the school system is mainly responsibile for the standard preparation of graduates from individual school levels throughout the entire republic, taking into account differentiation at individual levels and types of schools.

The curricula of individual levels and types of schools are based upon the integrity of education and upbringing, the main aim of which is the full and harmonious development of the personality.

All schools and educational establishments are state-owned and the education they provide is free of charge.

Education and upbringing in socialist society are a national concern rather than a matter for the school or the education system alone.

By the 1970s, the Czechoslovak school system had undergone unprecedented quantitative development, particularly in secondary and higher education establishments. They had prepared hundreds of thousands of skilled workers, middle-level technical staff and skilled specialists with higher education to work in all sectors of the national economy.

As a result of scientific and technological progress, as well as the strategy of accelerating socio-economic development, the school system, education and upbringing evolved towards a qualitatively higher level. In order to master the latest advances in science and technology it is necessary that the young people who are being trained for life and work should receive education of a high standard in a developed socialist society. It is desirable to give them a high level of universal, polytechnical and theoretical education, to prepare graduates with a broad vocational orientation enabling them to react more promptly to the increasingly rapid changes taking place in the working world, and to be trained in the necessary specializations.

The new political and socio-economic priorities for developing society called for a basic reform of the entire education system.

The guidelines for restructuring and updating the Czechoslovak education system were laid down in the document on 'further development of the Czechoslovak education system' adopted by the Presidium of the Central Committee of the Communist Party of Czechoslovakia on 4 June 1976.

This document introduces not only a substantial reform of the entire formal system, but also of the other systems of education, thus fulfilling a strategic aim to establish a comprehensive nationwide system of formal and non-formal lifelong education. The formal system of education and upbringing is the basis for a lifelong education system bringing together the workers' and out-of-school education systems.

The education system is conceived as an open system both in terms of the dynamic development of society and in terms of its internal structure, and as an interlinked system as well. Thus, creating the circumstances for continuous and purposeful innovation of the content, methods and forms of instruction in order to introduce and apply up-to-date and effective teaching methods and managerial systems without interfering with the smooth running of school work.

The task of the school — to furnish graduates with an appropriate quantity of special knowledged from different branches of science — comes to the fore together with the task of encouraging graduates to master learning methods, to handle information, and to classify and adopt knowledge throughout the

process of lifelong education. According to Act No. 29/1984 of the Law Code, compulsory school attendance has been prolonged to ten years. Starting with the school year 1984/85, the entire school-age population will receive ten years of secondary education. The short-term objective for the further democratization of the Czechoslovak education system is to provide all young people with complete secondary education. This objective is to be attained through the integrated and internally streamed twelve-year secondary school. Remarkable qualitative and quantitative developments are anticipated in higher education institutions so that a larger proportion of youth and working people can obtain higher qualifications, both in day-time and evening courses.

The Czechoslovak education system is being constructed as an integral whole and it is made up of:

- *day-nurseries and nursery schools* (for children under the age of 6. In 1988, 95% of the child population between 3 to 6 years of age was enrolled in nursery schools);
- *primary schools*, divided into the first grade, consisting of forms 1 to 4, and the second grade with forms 5 to 8;
- *secondary schools*, including vocational secondary schools, specialized secondary schools and conservatories, and grammar schools;
- *special schools* for handicapped children;
- *institutions of higher learning;*
- *adult education establishments.*

The Czechoslovak education system also includes popular schools of art, popular schools of languages, other language schools, social educational establishments, and a system of educational counselling.

THE AMOUNT OF PSYCHOLOGY IN SECONDARY SCHOOL CURRICULA

The fact that an ever greater proportion of psychology is included in curricula bears witness to the importance attached to psychology as a subject of study, even at the secondary level.

In grammar schools, the main task of which is to prepare young people for study in higher education establishments as well as for other spheres of activity, psychology is taught:

(a) within the branch of study called cultural-educational activity in the special subject 'Fundamentals of psychology and education' in Form 4 for two lessons per week;

(b) as an optional subject, 'Fundamentals of psychology and education', for all students of grammar schools in Form 4 for three teaching hours per week;

(c) the subject 'Fundamentals of psychology and education' is also taught as an option in Forms 1 to 4 at grammar schools.

In secondary specialized schools, which prepare middle-level technical staff for all sectors of the national economy, psychology is taught as follows:

In *commercial academies* in the branch 'Economy of trades and services', psychology is taught as a compulsory special subject in Form 3 with two lessons per week and in Form 4 as an optional subject with two lessons per week. In the other branches of study, the subject 'Psychology of work' is taught as an optional subject for two lessons per week, and in Form 4 as a optional subject with two lessons per week.

In *pre-primary teacher training* psychology is a compulsory special subject in all four forms with two lessons per week. The subject 'Psychology of work' is taught as an optional subject in all secondary specialized schools.

A special and a more distinct place is represented by the subject 'Psychology' in *secondary medical schools*. It is taught as a compulsory special subject in Forms 2, 3 and 4 during two lessons per week.

More and more lessons are allocated to the subject of psychology in *secondary vocational schools*, which prepare young people for skilled trades.

At present, psychology as a social-scientific subject is taught in twenty-five branches of study in Forms 2, 3 and 4 with two lessons per week. Psychology is taught both in day-time and in part-time courses.

The number of lessons allocated to psychology in secondary school curricula is regarded as unsatisfactory. In the forthcoming curricula innovations it is anticipated that the instruction of this subject will be stepped up in all branches of study, combined with a scheme to prepare a sufficient number of teachers with improved expertise.

THE EDUCATIONAL COUNSELLING SYSTEM

Educational counselling contributes to solving special problems in the intellectual and social development of children and young people, and in their preparation for life and work in society. In Czechoslovakia, constant attention is given to these issues and, for this purpose, a system of educational counselling has been built up institutionally and organizationally, operating in primary and secondary schools.

Within the framework of its activities, educational counselling:

(a) helps to resolve educational and psychological questions concerning the career guidance of children and young people;

(b) contributes to the overall care for the healthy spiritual and social development of children and young people in society, in the development of

their personality through the process of education and upbringing in school and in the family;

(c) pays special attention to deficiencies in the development of children and young people from the standpoint of educational, psychological and social norms, to their identification, prevention and rehabilitation.

The system of educational counselling operates through the educational counselling establishments set up at schools, as well as through regional and district national committees. The different units consist of an educational counsellor, a regional educational-psychological counselling centre, and a district educational-psychological counselling centre.

The educational counselling establishments carry out information, diagnostic, counselling, methodical and re-educative activities. In order to fulfil their task they use educational and psychological methods and procedures. They co-operate with health-service institutions and with institutions providing care for children, young people and their familie.

Educational counsellor

The post of educational counsellor is established in primary schools, in special schools for handicapped children and in secondary schools. Skilled educators with special psychological education are appointed as educational counsellors.

The activity of the educational counsellor is supervised by the school principal. Methodical guidance is provided by the respective educational-psychological counselling centre.

The basic tasks of educational counsellors include:

— paying special attention to providing information relevant for the choice of further study and a profession;
— co-ordinating and guiding the counselling and information activity of the teaching staff in schools, assessing the pupils' development and creating conditions for healthy intellectual and social development through education and upbringing in the school and family, overcoming disturbances that interfere with the educational process, describing the pupil's character, and providing long-term vocational guidance for pupils according to their interests and the needs of society,
— to provide individual consultation and advice to pupils and their parents, and to assist in finding answers to educational and instructional problems, or questions concerning studies in secondary and post-secondary schools, as well as those relating to the choice of profession.

While performing their functions, educational counsellors co-operate with executive bodies of the state administration, with secondary schools and col-

leges, with the medical services for young people, with the parent/teacher associations, and with youth organizations.

Regional educational-psychological counselling centres

The regional educational-psychological counselling centre is an establishment of the regional national committee and fulfils the following tasks, in particular:

- vocational guidance of pupils in schools managed by the regional national committees (these are secondary schools, and special schools for handicapped children); it handles information on the possibilities and needs of study in higher education institutions, on further study in secondary schools and on professions;
- special advice for educational counsellors and psychologists in secondary schools;
- it monitors and examines professional options of pupils in secondary schools and special schools for handicapped children with a view to social needs and trends in economic and technical development;
- educational-psychological assessment of pupils attending educational establishments, and preparation of reports on them for the guidance of schools, other educational establishments and parents, or for the legal and national health authorities;
- individual consultation and advice for pupils, teachers and educators concerning questions of intellectual and social development, solving educational and instructional difficulties and tasks, and choosing establishments for further study or for a profession;
- preventive and remedial methods for overcoming educational and instructional difficulties and shortcomings;
- in co-operation with the executive bodies of national committees and social organizations, it investigates those who unfavourably influence young people's development;
- it provides special assistance and methodical guidance to the activity of district educational-psychological counselling centres, to social organizations, institutions and individuals;
- it informs educators and the general public about the possibilities of utilizing the services that it provides, about current questions of psychological and social development for young people, up-to-date knowledge about the educational and psychological sciences, problems of vocational guidance, and the personnel needs and requirements of the national economy.

The regional educational-psychological counselling centre has the following departments: counselling on professional development; counselling on edu-

cational development; counselling on personal development; and the methodical department.

District educational-psychological counselling centres

District educational-psychological counselling centres are establishments set up by district national committees. Their activity involves all schools and pupils under the responsibility of the district national committee, i.e. primary schools, special schools and pre-school establishments (nursery schools and kindergartens) managed by municipal and local national committees.

Within the area of its competence the district educational-psychological counselling centre fulfils in the main the same tasks as the regional educational-psychological counselling centre.

All services provided by educational counsellors and educational-psychological counselling centres are free of charge.

The function of carrying out scientific research and that of the methodical centre for educational counselling is fulfilled by the Research Institute of Child Psychology and Pathopsychology in Bratislava.

The Commission for Educational Counselling, under the Governments of the Czech Socialist Republic and the Slovak Socialist Republic, is a political body on educational counselling.

* * *

A significant part of educational counselling consists of the so-called 'predicting system'.

The significance and role of the predicting system lie in the fact that it helps the child, parents, schools and school administrations on questions of vocational guidance and in resolving individual interests with social requirements. The predicting system complements the system of educational counselling in a school, for a given group of pupils and for individuals. Finally, it makes the whole system of vocational guidance more pertinent and, particularly, it facilitates the pupil's (or the parent's) choice of educational establishment or profession. It helps to minimize and eliminate nepotism and subjectivism influencing admission to secondary schools, but, in spite of this, it is but one part — an aide and a tool — in the system of educational counselling.

During the early school years general vocational preparation is taking place. Later on, the importance of polytechnical education and work education grows leading eventually to specific vocational guidance, and culminating in a definite choice of career and, thus, of study in one of the three types of secondary school. The predicting system is particularly influential at the final stage, when a final decision for a particular school and job is made.

The importance of the predicting system is therefore rooted in the political and social demands and requirements of educational practice.

The predicting system provides pupils, parents and schools with more precise and up-to-date information. More particularly, it provides current information for pupils (or their parents) about the actual possibilities of being admitted to the school of their choice. Prior to this, educational counsellors often complained that they had no arguments at their disposal with which to influence pupils when there was a need for re-orientation. The predicting system has altered the situation. We can cite the following example: in one district thirty-five pupils wanted to apply to a secondary teacher training college. They were only provided with classical counselling so that all thirty-five signed the application form for study at that teacher training college, in spite of the fact that there were only fifteen vacancies. In the end only this quota was accepted and the other twenty pupils were disappointed. As soon as the predicting system was introduced, the educational counsellor was able to inform every pupil of his/her chances of being admitted to a secondary teacher training college and, at the same time, to recommend an alternative where there was a stronger probability of being accepted. Since this is a specific instance from a given district, we can record that, when the time came for a definite decision, ten pupils changed their minds in favour of the more logical choice.

The third remarkable advantage of the predicting system for vocational guidance is the application of the findings of research. For many years, the sciences of education, psychology and educational counselling in this country and abroad have examined and applied in practice the outcomes of research on vocational guidance. Several concepts on educational counselling have been put forward, e.g. the biodromal concept of J. Koščo (1980), educative-formative and development counselling by J. Hvozdík (1982), the counselling system of Klímová (1981), Fedorišin's conception in the USSR (1981), and so on. The predicting system is not in contradiction with the above concepts. As an auxiliary system, it is closely associated with them and it is possible to incorporate them into the predicting system. On the basis of research experience, it may be stated that feedback from the predicting system helps to improve these concepts.

We proceed from the assumption that timely, accurate and up-to-date information provided to pupils about their chances of admission to secondary schools will enable the pupils' vocational choice to be realized while reconciling individual interests with national manpower requirements.

A project was designed to create and experimentally verify a system which would take into account all the information relevant to the procedures influencing admission to secondary schools. The information used to create the predicting system model was drawn from existing databases and therefore

no additional administrative work was expected of schools; on the contrary, procedures were considerably simplified as a consequence.

The process of a pupil making a decision about a future career is analogous to the universally postulated model. The pupil accepts data from the outside world — items of information on occupations, schools, etc. — and then processes them through the predicting system which operates on the basis of interdependent intellectual processes (memory, intelligence, attention, imagination). There are two basic principles:

1. *The principle of experience* — empiricism (the pupil draws on past experience on decision making accumulated during life and, on the basis of analogy, transfers this experience to new decision-making situations). Due to the fact that this is the first time the pupil is making a decision on professional development (the first choice of direction) and that such a decision cannot be adequately based on the real conditions operating in the outside world simply on empirical principles, it is not very reliable from the point of view of making a suitable choice.
2. *A rational principle* — a principle based upon the level of competence reached in the course of development (analysis, synthesis, generalization, abstraction) in estimating alternative prospects. Despite a relatively high level of development of intellectual operations in this period (14 to 15 years of age), its efficiency from the standpoint of accurate decisions is nevertheless limited by the individual's ability to apply these intellectual processes both to specific situations and to vocational choice. A developing individual lacks the appropriate skills to handle vocational information, particularly in relation to estimating the alternatives.

The functioning of both of these anticipating principles constitutes a subjective forecasting system that operates on the basis of subjective probabilities the adequacy of intellectual operations. A lack of experience in this respect causes uncertainty resulting in tension that cannot be considered pathological but, regarding the given facts, adequate. This subjective forecasting system should be replaced by an objective one, to help the pupil lessen the uncertainty and eliminate the risk. The predicting system fulfilling these criteria is represented by the statistically prognostic system which quantifies the alternative prospects and presents them in a numerical way in terms of statistical probability.

The predicting system forecasts the objective probabilities of the pupil's admission to a school, i.e. a prediction of the first and basic condition of the causal relation: admission of pupil to school; study record; achievements and satisfaction with the vocation; achievements and satisfaction with the future career, with life.

Maximizing the estimated weight of each alternative and minimizing the risk may be considered the most basic criteria for decison making. Since the aim is

not to impose the activity of the decision-making system as a whole on the pupil, but simply the functioning of the predicting system, and particularly concerning the chance of admission to a particular secondary school, respect for the basic criteria of decision making forms the methodological starting point. We presume that maximizing the anticipated profit and minimizing the risk are the basic criteria according to which the choice of alternatives should be carried out (Danko, 1984), i.e. the pupil chooses the school that, within the framework of his/her objective possibilities, will meet his/her needs most of all, where the risk of being turned down or of experiencing failure is minimal. Our predicting system aims at a mathematical-statistical anticipation of the maximum risk of individual alternatives, thereby providing the pupil, the parents and counsellors with an objective basis for making a decision while respecting the standard of minimal risk.

The aim of the predicting system is to forecast the probability of admission/non-admission of the pupil to a particular secondary school. Since the admission procedure is supervised by the admission commission, the aim of the system is to predict the decision of the admission commission. Inevitably, although all types of secondary schools are guided by identical regulations on admission procedures, in actual practice there is considerable variety between different schools. Each school has its own characteristics arising from local priorities, from the traditional structure of admission policies and from the socio-cultural environment.

Conclusion

We are well aware that, in the theory and practice of education and upbringing, all psychological disciplines have determined their own positions. However, most helpful for teachers and educators are those psychological disciplines that are most closely connected with the sciences of education, as well as with the practice of education and upbringing. They are, first of all, educational psychology as a basic discipline for the educational sciences, then school psychology as employed in practice by experienced school psychologists, and last but not least teacher psychology, synthesizing the knowledge of several basic, special and applied psychological disciplines for the purposes of conducting teaching activity. These disciplines encompass especially the notions of general psychology, ontogenetic psychology, educational psychology, social psychology and remedial educational psychology.

In actual fact, teacher psychology surpasses the individual components of the psychological sciences as a whole. Perhaps it will not be too outrageous to state that in no human activity is psychology as a whole, as well as its specialized disciplines, so intensively employed as in education and upbringing. On the other hand, out of all the spheres of practice, the most important for the psychology of children, young people and even adults is the practice of training people, the practice of education and upbringing.

Without taking educational practice into consideration, psychological knowledge about the child, adolescent or adult cannot be unambiguously applied. Relations between psychological knowledge and educational practice are bi-polar, in the same way as the relations between the teacher and the pupil. Getting to know pupils and students through education and upbringing represents the most effective educational activity, the most fruitful way of getting acquainted with their psyche. Therefore the most suitable psychological method in formal and out-of-school education institutions is considered to be

the day-to-day experience, carried out with the help of the psychologically alert teacher (we still do not have school psychologists in all our schools).

In the process of the teacher's and educator's practical work there is a constant mutual influence between psychological knowledge (knowledge of psychology for teachers) and educational work. This does not mean, however, that the clear scientific distinction visible in principle between psychology and education is no longer valid. They both have their own fields of investigation.

Another idea suggests that psychological research should not be reduced simply to the solution of practical problems. The more vigorously psychology develops its own concrete, specific and central, not only marginal, spheres of interest, the more profitable it is for the educational sciences.

A major task for psychology in general, and especially for those psychological disciplines that are most closely connected with the educational sciences, is to reveal the inner psychic background of human activity; the way in which a person manifests himself/herself, i.e. the way psychic characteristics are educated.

Our monograph has presented only some of these varied tasks. We believe, however, that it will stimulate those for whom it is intended to think about the problems.

The closing part outlines the organization of psychological services for the school, particularly in the form of establishing posts for school psychologists, and in the form of psychological-educational counselling, starting from educational counsellors in the schools, and proceeding through district and regional educational-pyschological counselling centres up to the governmental committee for counselling.

APPENDIX: Selected bibliography

Educational, school and teacher psychologies

Adler, A. *The education of children.* New York, 1930.
Bruner, J.S. *O podstate a problémoch vyučovania* [On the substance and problems of instruction] Bratislava, SPN, 1968. 165 p.
Ďurič, L.; Grác, J.; Štefanovič, J. *Pedagogická psychológia* [Educational psychology] Bratislava, SPN, 1988. 333 p.
Ďurič, L. *Úvod do pedagogickej psychológie* [Introduction to educational psychology] Bratislava, SPN, 1981. 300 p.
Freud, A. *Pudový život dítěte: psychoanalýza pedagógov* [Instinctive life of the child: psychoanalysis of educators] Praha, Volné myšlienky, 1937. 77 p.
Kelemen, L. *Pedagógiai pszichológia* [Educational psychology] Budapest, Tankönyvkiadó, 1981. 692 p.
Lindgren, H.C. *Educational psychology in the classroom.* New York, Wiley, 1956. 552 p.
Mialaret, G. *Introduction to the educational sciences.* Paris, Unesco, 1985. 106 p.

Psychological foundations of education

Clauss, G.; Hiebsch, H. *Psychológia detstva a dospievania* [Psychology of childhood and maturation] Bratislava, SPN, 1970. 361 p.
Grác, J. *Persuázia* [Persuasion] Bratislava, Osveta, 1985. 365 p.
Janoušek, J. *Sociálna determinácia psychiky a správania* [Social determination of psyche and behaviour] Bratislava, SPN, 1987. 77 p.
Kováč, D. *Teória všeobecnej psychológie* [The theory of general psychology] Bratislava, VEDA, ČSAV, 1985. 339 p.
Leontiev, A.N. *Problémy psychického vývoje* [Problems of psychic development] Praha, SPN, 1966. 404 p.
Leontiev, A.N. Činnost, vědomí, osobnost [Activity, consciousness, personality] Praha, Svoboda, 1978.
Švancara, J. *Biologická determinácia správania* [Biological determination of behaviour] Bratislava, SPN, 1975. 123 p.
Teplov, B.M. *Schopnosti a nadání* [Abilities and talent] Praha, SPN, 1951. 67 p.
Terman, L.M., et al. *Mental and physical traits of a thousand gifted children* 2nd ed. Stanford, CA, Stanford University Press, 1926. (Genetic studies of genius, vol. 1)

Psychological problems of learning, teaching and education

Bogojavlenskij, D.N.; Menčinskaja, N.A. *Psihologia usvojenija znanij v škole* [Psychology of the acquisition of knowledge in school] Moskva, Izd. APN RSFSR, 1959. 237 p.
Bruner, J.S., op. cit.
Foppa, K. *Lernen, Gedächtnis, Verhalten* [Learning, memory, behaviour] Köln, Fed. Rep. of Germany, H. Huber Verlag, 1966. 241 p.
Galperin, P.J. *Výber z diela* [Selected works] Bratislava, Psychodiagnostické a didaktické testy, 1980. 142 p.
Landa, N.A. *Algoritmy a učení* [Algorithms and learning] Praha, SPN, 1973. 180 p.
Linhart, J. *Psychologie učení* [Psychology of learning] Praha, SPN, 1967. 392 p.

Rubinštejn, S.L. *O myslení a spôsoboch jeho výskumu* [On thinking and ways of its research] Bratislava, SPN, 1960, 131 p.
Skinner, B.F. *The technology of teaching*. New York, Appleton-Century-Crafts, 1968, 271 p.
Thorndike, E. *Pedagogická psychologie* [Educational psychology] Brno, ÚSJU, 1929, 340 p.
Vygotskij, L.S. *Myšlení a řeč* [Thinking and speech] Praha, SPN, 1969, 293 p.

Psychological problems of developing creative thinking among pupils and students

Barron, F. *Creativity and psychological health*. New York, Van Nostrand, 1963.
Guilford, J.P. *Natura inteligencji człowieka* [The nature of human intelligence] Warszawa, PWN, 1978, 994 p.
Ďurič, L., et al. *Psychológia tvorivosti* [Psychology of creativity] Bratislava, SPN, 1986, 145 p.
Hlavsa, J., et al. *Psychologické problémy výchovy k tvorivosti* [Psychological problems of creativity education] Praha, SPN, 1981, 238 p.
Luk, A.N. *Psychológia tvorivosti* [Psychology of creativity]. Bratislava, Pravda, 1981, 150 p.
Pietrasiński, Z. *Tvorivé myslenie* [Creative thinking] Bratislava, Obzor, 1972, 239 p.

Performance efficiency and fatigue among pupils and teachers in the educational process

Ďurič, L. Výkonnosť žiakov vo vyučovacom procese [Efficiency of pupils in the instructional process] Bratislava, SPN, 1975, 509 p.
Ďurič, L. Výkonnosť a únava učiteľov vo vyučovacom procese [Efficiency and fatigue of teachers in the educational process] Bratislava, SPN, 1969, 263 p.
Pavlov, I.P. *Polnoe sobranie trudov* [Complete collection of works] Moskva, Izd. NN SSSR, 1951.
Rozenblat, V.V. *Problema utomlenija* [Problem of fatigue] Moskva, 1961, 360 p.
Sečenov, I.M. *Válogatott művei* [Selected works] Budapest, Académia, 1935, 280 p.
Selye, J. *Život a stres* [Stress of life] Bratislava, Obzor, 1966, 454 p.
Vvedenskij, N.J. *Vzruch, útlm a narkóza* [Excitation, inhibition and narcosis] Bratislava, SPN, 1953, 320 p.
Ďurič, L. *A pedagógus teljesítőképessége és fáradsága* [Efficiency and fatigue of teachers] Budapest, Tankönyvkiadó, 1973, 159 p.

A child matures into an adult through its own activity and through the influence of its social surroundings — the unity of organism and environment. But there is one social influence, a decisive external influence, which is purposeful, planned, professional and institutionalized. This social influence is called 'education'. Educational psychology investigates the psychological foundations of the educational process, particularly the purposeful development of man. This book is intended for university students of psychology, teachers in primary and secondary schools, and specialists in education and educational psychology. The author, Ladislav Ďurič of Comenius University, Czechoslovakia, after defining educational psychology as a discipline spanning the frontier between the psychological sciences and the educational sciences, describes its contribution to teaching and learning.

Unesco ISBN 92-3-102631-3
Jessica Kingsley Publishers ISBN 1-85302-054-0